

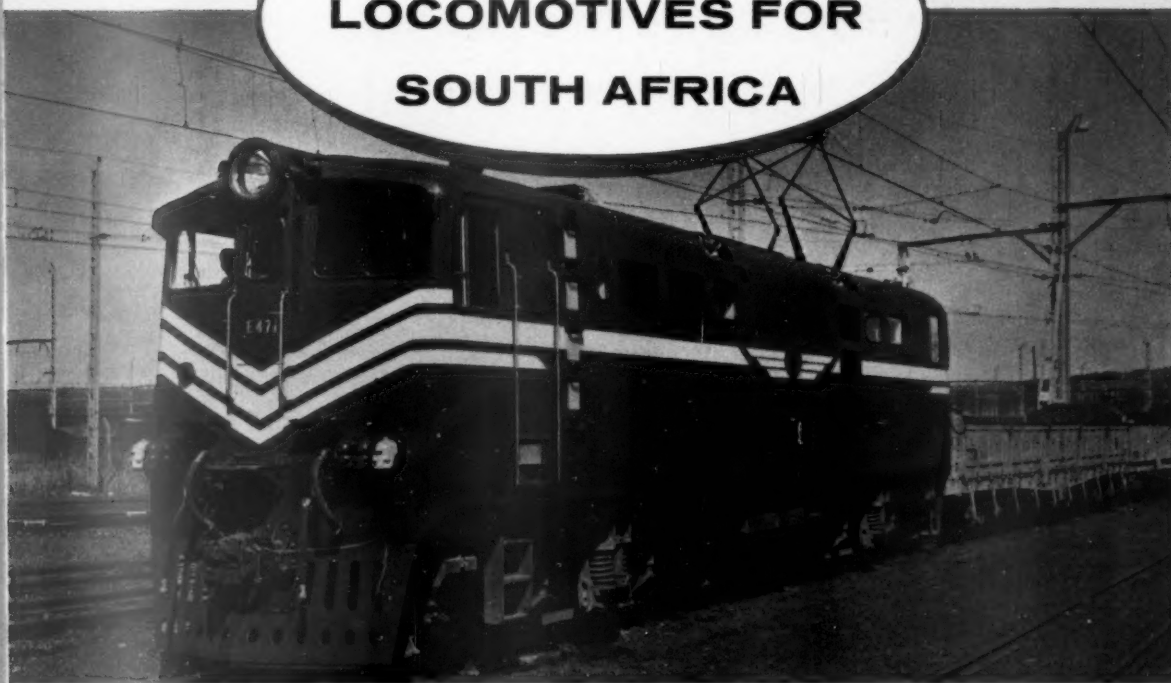
# THE RAILWAY GAZETTE

Price: Two Shillings

FRIDAY, MARCH 3, 1961

Annually £5 by post

## AEI 3000 volt LOCOMOTIVES FOR SOUTH AFRICA



*One of the 135 AEI 3000 volt  
2280 hp 84 ton D.C. electric  
locomotives, in service with  
South African Railways.*

No fewer than 345 electric locomotives have now been ordered from AEI by this customer together with 350 sets of motor coach equipment for the Reef and Cape Western electrifications.

*Enquiries to AEI Traction Division, Trafford Park,  
Manchester 17, or your local AEI Office.*



**Associated Electrical Industries Ltd.  
Traction Division**

**MANCHESTER · RUGBY · LONDON**

K/T 018 ch

# SIMPLICITY & COMFORT

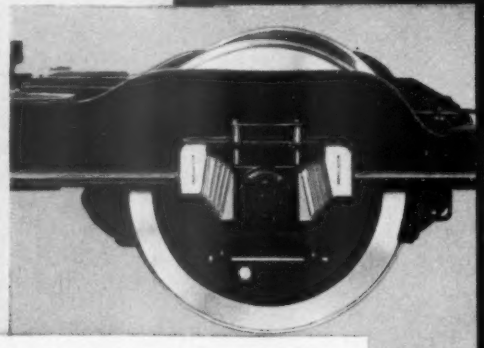
## AXLEBOX SUSPENSION



The Metalastik "chevron" rubber spring, by reason of its three-dimensional constraint, eliminates horn guides, hangers, pins, etc.

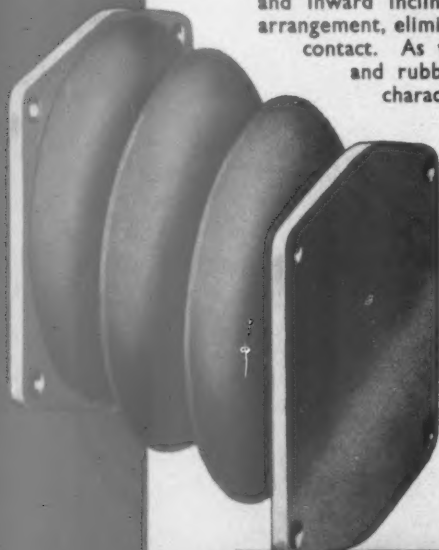
Providing a sweet-acting suspension, free from the harshness introduced by friction it is stiff enough in other directions to limit transverse movement and keep the axles parallel.

On the left is a two-chevron spring fitted by London Transport Executive. In the suspension shown on the right, springs with four chevrons are used to provide the higher deflection required for higher speeds. By altering the angle at which the springs are set and the rubber hardness, axlebox suspensions for all types of locomotive, railcar, carriage and wagon can be provided with a few standard units.



## NO METAL-TO-METAL CONTACT

## BOLSTER SUSPENSION



Metalastik bolster suspension is of the utmost simplicity. The upward and inward inclination of the springs caters for all forces in one arrangement, eliminating a great number of parts and all metal-to-metal contact. As with the axlebox springs, variations in the setting and rubber hardness allow a wide choice of load/deflection characteristics with a few standard designs.

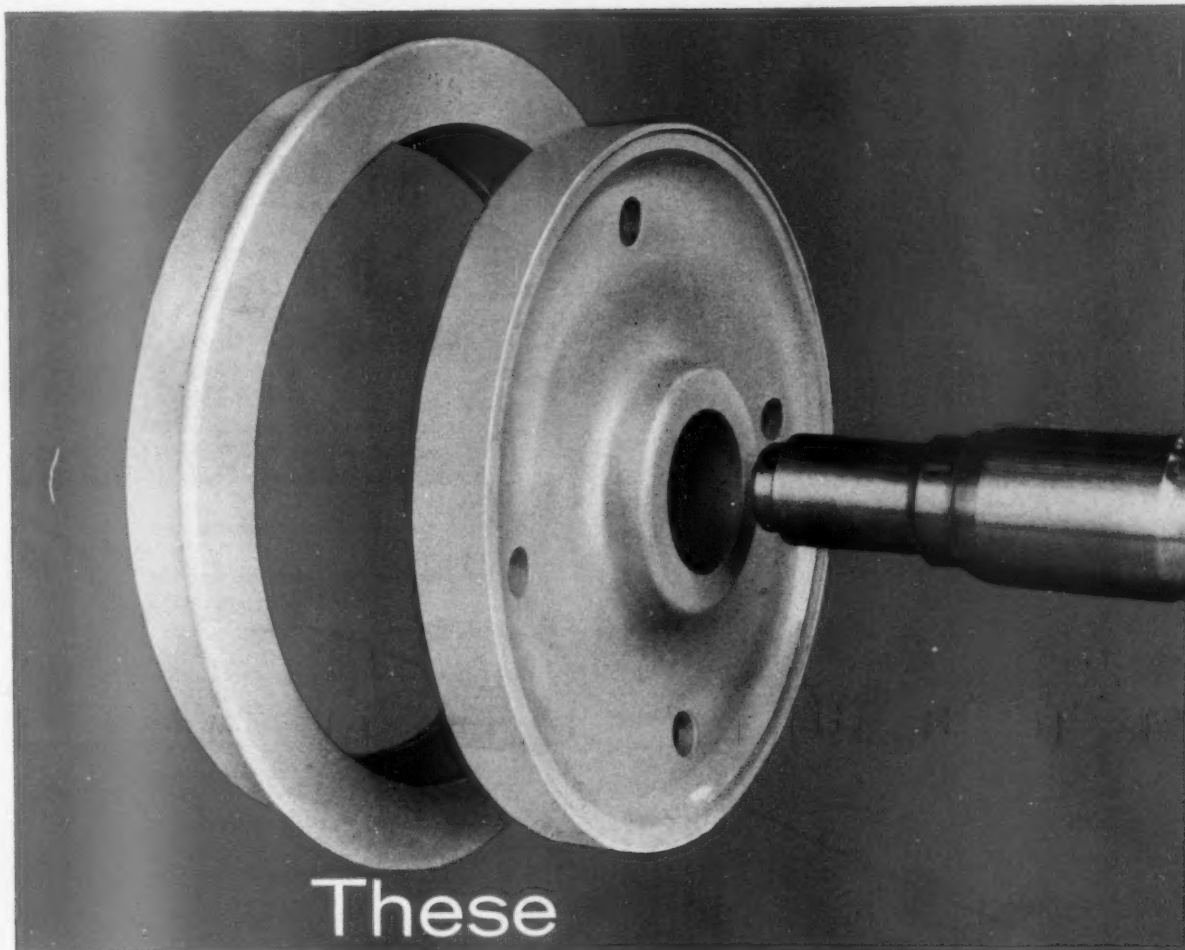
The bolster spring on the left is fitted by London Transport.

The photograph (right) shows a bolster suspension for a main line carriage. It is used with the axlebox suspension in the upper photograph.

Originally developed in association with London Transport, Metalastik bogie suspension has been proved in service over half-a-million miles. While providing a comfortable ride with a reduction in noise, it effects substantial economies in maintenance by eliminating lubrication and wearing parts. Furthermore, it reduces power consumption by reducing weight.



# METALASTIK



## These wheels have a history

The ever-growing number of diesel railcars on our railways call for wheels, tyres, and axles like these made by Steel, Peech & Tozer and machined and assembled into complete sets by Owen & Dyson Limited.

Steel, Peech & Tozer has nearly seventy years' experience in making quality steel. Today, the company supplies the railways of the world with special steels to withstand high temperatures, heavy loading, and high levels of stress.

### **steel, peech & tozer**

THE ICKLES ROTHERHAM YORKSHIRE

*A branch of The United Steel Companies Limited*

THE UNITED  
**STEEL**  
COMPANIES LTD

SP.591

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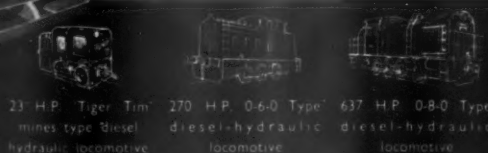


# HUNSLET LOCOMOTIVES

*serve the world*

Hunslet locomotives have a reputation for absolute reliability. That is why you will find them all over the world, in all climates, on every class and gauge of railway.

Wherever they are, above or below ground, on plantation or docks, on contracting work, or main line haulage, Hunslet Locomotives have remained in the lead for quality for nearly 100 years.



23 H.P. 'Tiger Tim' mines type Diesel hydraulic locomotive    270 H.P. 0-6-0 Type diesel-hydraulic locomotive    637 H.P. 0-8-0 Type diesel-hydraulic locomotive

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London Office: Locomotive House, Buckingham Gate, S.W.1.

### Associated Companies:

Hunslet Taylor Consolidated (Pty) Ltd., P.O. Box 57, Cleveland, Transvaal.  
Hunslet Engineering Central Africa (Pvt) Ltd., P.O. Box 2581, Salisbury, S. Rhodesia.  
Hunslet Locomotives Canada Ltd., P.O. Box 580, Halleybury, Ontario.  
*Agents in many parts of the world*



# **MULTIPLE UNIT STOCK FOR KENT COAST ELECTRIFICATION**

Photo by courtesy of  
British Railways, Southern Region

**Fifty-three of these four-car express  
electric units built by British Railways  
at Eastleigh Works, Southern Region,  
for the Kent Coast Electrification are—**

**BRAKED BY**



**THE WORLD'S GREATEST AND  
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MANUFACTURER OF**

**THE  
ELECTRO-PNEUMATIC BRAKE**

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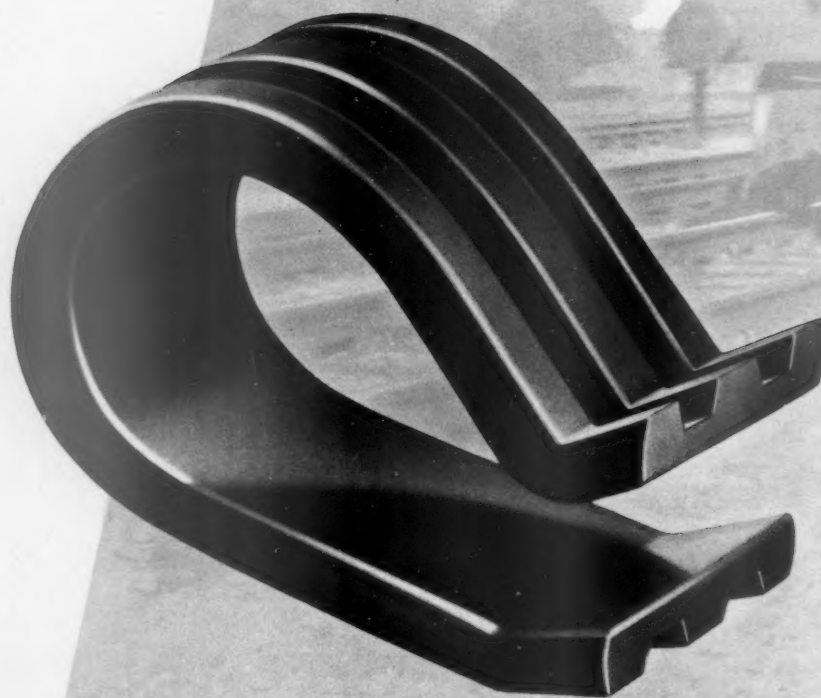
Westinghouse Brake & Signal Co. S.A. (Pty.) Ltd.,  
Johannesburg. Agents—Bellamy and Lambie, Johannesburg

# **THE MILLS RAIL**

PATENT

## **AND BASEPLATE**

Whenever a Mills Clip  
is fitted, it is fitted  
correctly.



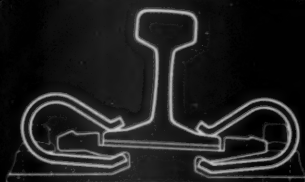
Photograph by  
Courtesy of British Railways



**EXORS OF JAMES MILLS LTD**  
**BREDBURY STEEL WORKS**

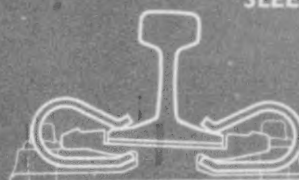
# CLIP

FOR WOOD SLEEPERS



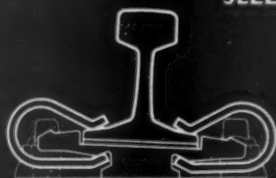
Four-hole baseplate  
with or without  
rubber rail pad.

FOR 'E' TYPE CONCRETE  
SLEEPERS



Two-hole baseplate,  
interchangeable with  
CSI Bullhead Chair.

FOR 'F' TYPE CONCRETE  
SLEEPERS



Small Area  
two-hole baseplate  
for main line use.

Every Mills Clip fitted applies  
a uniform load to the rail  
within a known range.

Very suitable for long welded  
rails and all heavy duty track

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During 3 years continuous service at Swindon Wagon Works, a Coles self-propelled 'ARGUS' crane has given "complete satisfaction", reports British Railways (Western Region). The crane is used exclusively for handling scrap metal, and its introduction has resulted in increased economies, enabling five men to be released for other work.

Records show that for an 8 hour shift—during which a maximum scrap throughput of 100 tons has been achieved—fuel consumption has averaged only  $2\frac{1}{2}$  gallons.



**COLES**<sup>\*</sup>  
CRANES

**THE NAME THAT CARRIES WEIGHT**

\*Registered Trade Mark

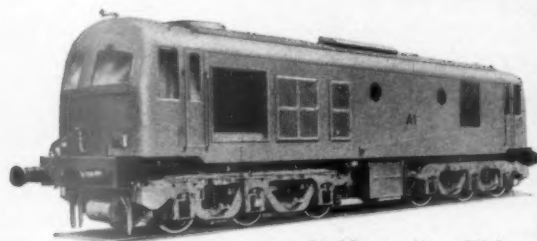
**STEELS  
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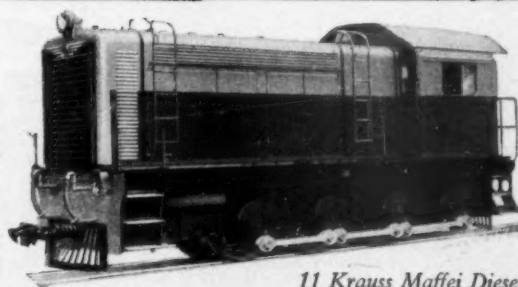
SALES AND SERVICE: LONDON, BRISTOL, BIRMINGHAM, MANCHESTER,  
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# MODERN VACUUM BRAKE SYSTEMS

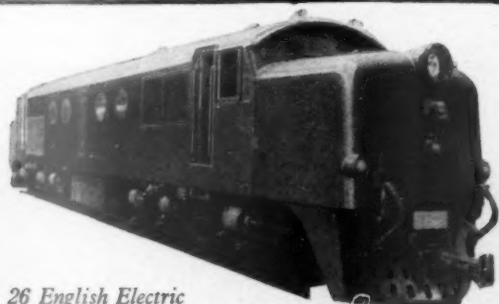
## for diesel and electric locomotives and for diesel railcar sets



60 Metropolitan Vickers  
Diesel Electric Locomotives for C.I.E.



11 Krauss Maffei Diesel  
Hydraulic Locomotives for Siam.



26 English Electric  
Diesel Electric Locomotives for Malaya.



Over 3,500 sets for  
British Railways.



### FOR LOCOMOTIVES

Gresham's Augmented Vacuum Brake System.  
British Patent No. 732031. Write for List 79.

### FOR DIESEL RAILCAR SETS

Gresham's Quick Release A.I.V. Vacuum Brake System.  
British Patent No. 790657. Write for List 78.



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# METCALFE-OERLIKON

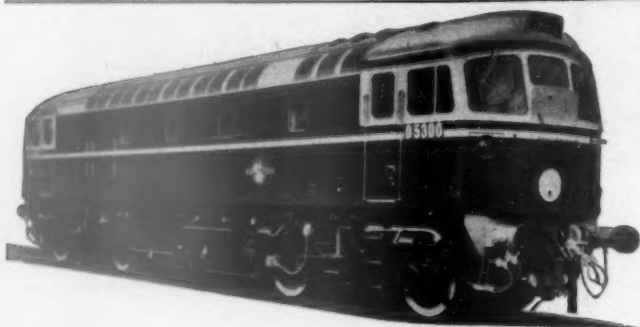
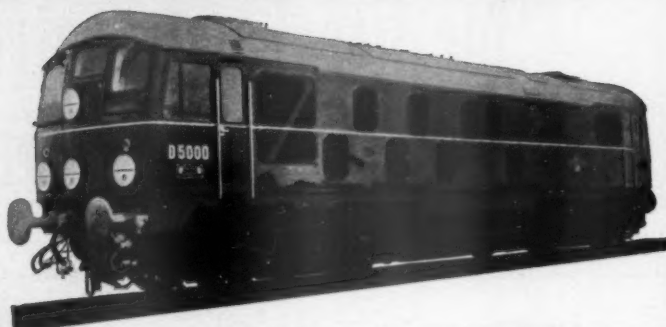
## MODERN BRAKE EQUIPMENT

### 1160 H.P. Type '2' Diesel-Electric Locomotives.

Built by the Derby, Crewe and Darlington works of the B.T.C.

176 of these locomotives are to be supplied with Sulzer Engines and Power Equipment by A.E.I. Traction Division.

Metcalfe-Oerlikon brakes are also fitted.



### 1160 H.P. Type '2' Diesel-Electric Locomotives.

Built by the Birmingham Railway Company & Wagon Co. Limited.

47 of these locomotives have Sulzer Engines and Crompton Parkinson Power Equipment. Metcalfe-Oerlikon brakes are also fitted.

### 1100 H.P. Type '2' Diesel-Electric Locomotives.

Built by the North British Locomotive Company Ltd.

They have N.B.L./M.A.N. Diesel Engines and General Electric Company Power Equipment.

Metcalfe-Oerlikon brakes are also fitted to 38 of these.



The above are just three of the many types of Main Line Diesel-Electric Locomotives now in service with British Railways, and all are equipped with 'Metcalfe-Oerlikon' patent Vacuum Controlled Air Brake Equipment.

**Undiminishing Performance**  
**Light Weight**  
**Friction Free Valves**  
**Reduced Maintenance**  
**Easy Installation**

Suppliers to the World's Railways since 1870

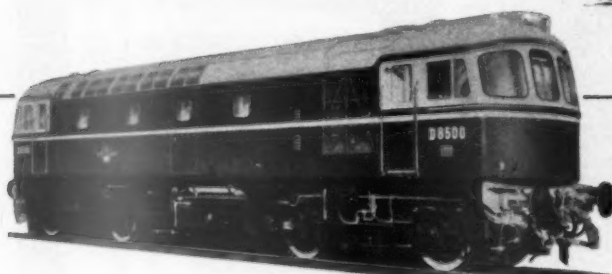
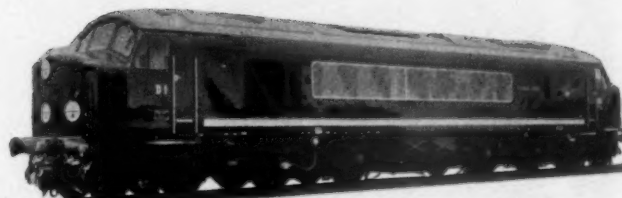
# DAVIES & METCALFE LIMITED



# METCALFE-OERLIKON

## MODERN BRAKE EQUIPMENT

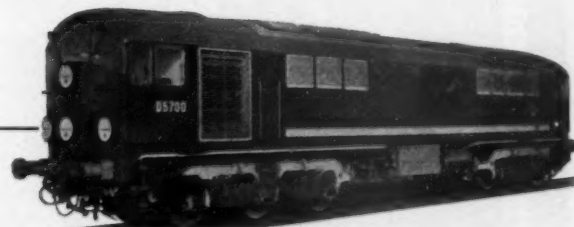
- 10 — 2300 H.P. Type '4' Diesel-Electric Locomotives. Built by the Derby Works of the B.T.C. and fitted with Sulzer Engines and Crompton Parkinson Electrical Equipment. 10 of these Locomotives are in service with British Railways and a further 137 are now building.



- 1550 H.P. Type '3' Diesel-Electric Locomotives. Built by the Birmingham Railway Carriage & Wagon Co., Ltd. and fitted with Sulzer Engines and Crompton Parkinson Electrical Equipment. 98 of these Locomotives are to be supplied, and these are arranged for working with either 'Vacuum' or 'Air' braked trains through a single Driver's Brake Valve.



- 20 — 1200 H.P. Type '2' Diesel-Electric Locomotives. Built by Associated Electrical Industries Ltd. and fitted with Crossley Brothers Ltd. engines. These Locomotives are now in service on British Railways.



- 52 — 1100 H.P. Type '2' Diesel-Hydraulic Locomotives being built by the North British Locomotive Co., Ltd. with N.B.L./M.A.N. Engines and Voith/North British Hydraulic Transmission.



**THE ABOVE LOCOMOTIVES ARE EQUIPPED  
WITH METCALFE-OERLIKON BRAKE EQUIPMENT**

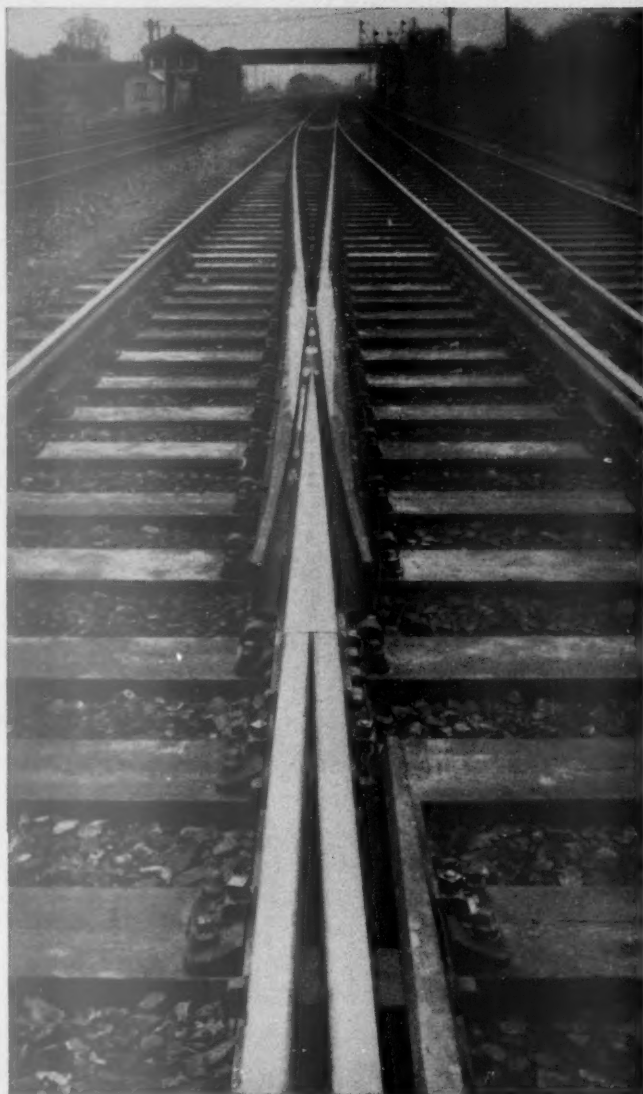
JUST ANOTHER FOUR OF THE  
MANY TYPES OF MODERN MAIN  
LINE LOCOMOTIVES NOW IN  
SERVICE WITH BRITISH RAIL-  
WAYS. ALL ARE EQUIPPED  
WITH METCALFE-OERLIKON  
MODERN BRAKE EQUIPMENT.

**ENGINEERS · ROMILEY · ENGLAND**

TELEPHONE: WOODLEY 2626

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# *Important Development!*

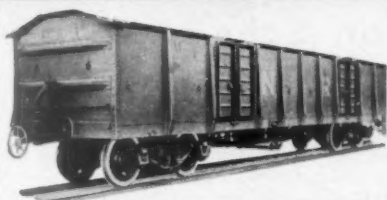
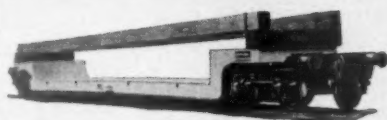
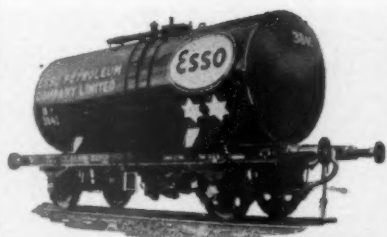


Photograph reproduced by courtesy of  
British Railways (Southern Region)

The accompanying illustration shows Solid Cast Monoblock Crossings of Hadfields Era High Manganese Steel, in situ at Worting Junction on the Southern Region of British Railways.

The Crossing angle 1 in 28, and approx. 25 ft. long, represents a new departure in the application of the cast monoblock type of Crossing, and are designed to carry heavy main line traffic at high speeds.

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SHEFFIELD



**STEEL, ALUMINIUM AND  
TIMBER WAGONS OF ALL  
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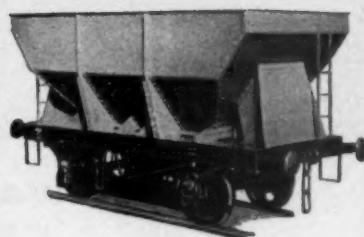
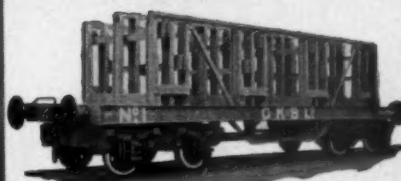
**Cambrian**



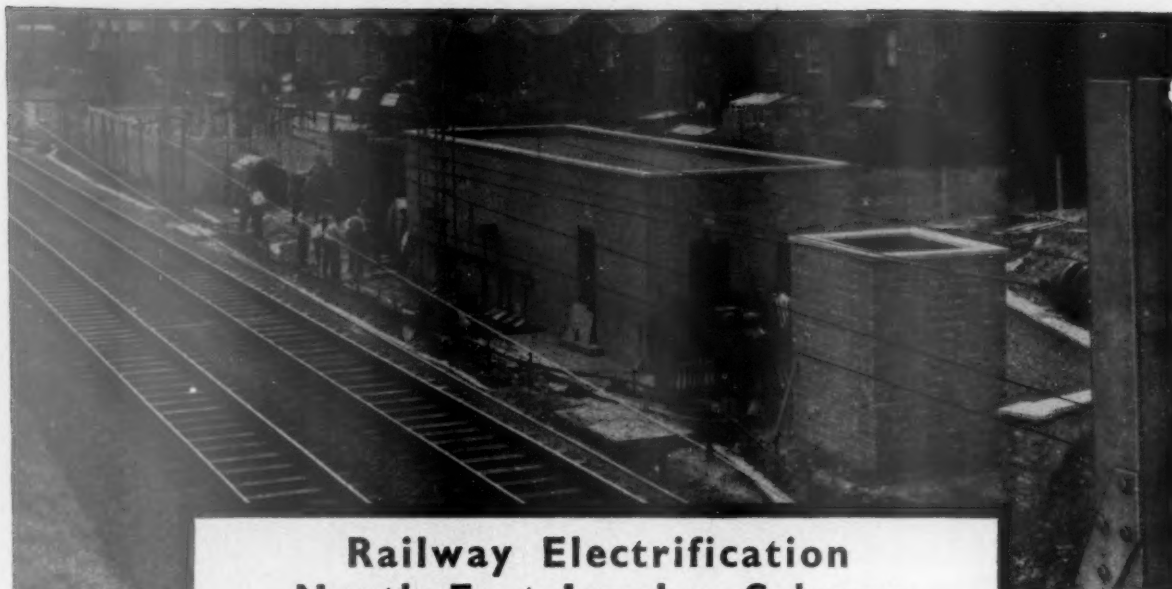
**rolling**



**stock**





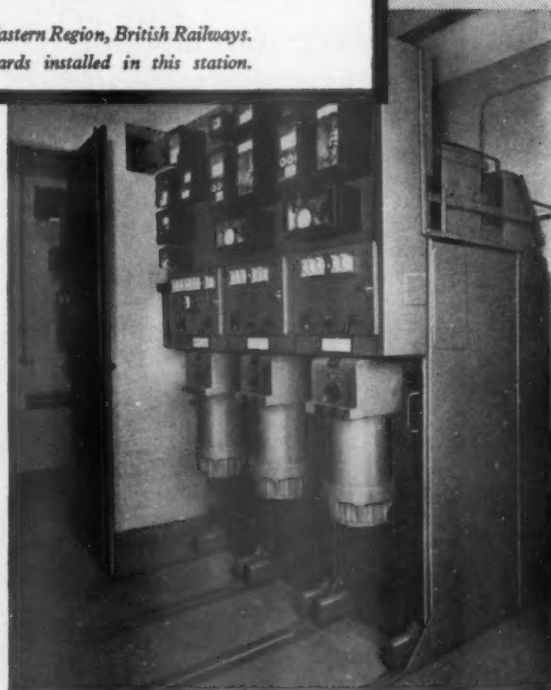
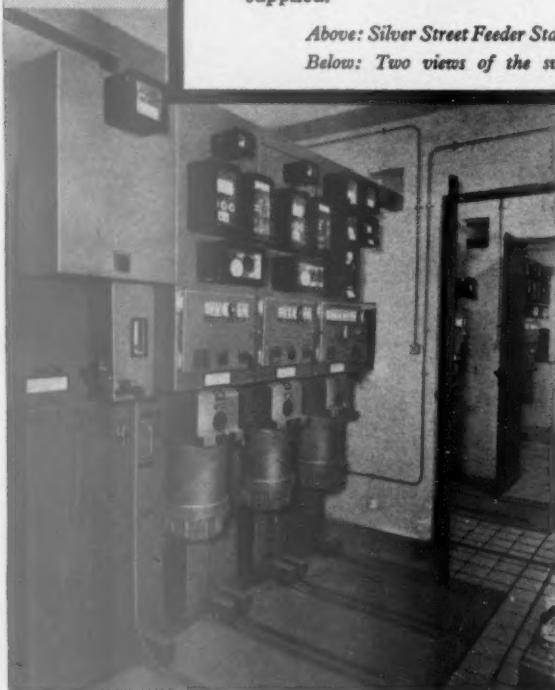


## Railway Electrification North East London Scheme British Railways : Eastern Region

S.W.S. Switchgear has been installed in large quantities in the railway electrification schemes of the British Railways, Eastern Region. This gear, which has been specially developed for the purpose, comprises single phase, air-insulated metal-enclosed oil circuit breaker units for 6.25 kV, 150 MVA 600A and 1200A duties, and fuse-switches designed to line up with the oil circuit breaker units and incorporating 3-position oil switches. Wall mounted, totally enclosed fuse-switch and distribution boards for substation heating and lighting and auxiliary services have also been supplied.

*Above: Silver Street Feeder Station, Eastern Region, British Railways.*

*Below: Two views of the switchboards installed in this station.*



**SOUTH WALES SWITCHGEAR LIMITED**

BLACKWOOD • MONMOUTHSHIRE • WORKS AT TREFOREST AND BLACKWOOD  
SWITCHGEAR • FUSE-SWITCHGEAR • TRANSFORMERS • CONTROL BOARDS



# *Obstructionless RAILWAY TRACK JACK with a ten ton lift*

**HYDRAULICS** have made possible the greatest advance in Permanent Way Maintenance ever known. The ABTUS Hydraulic Railway Track Jack has the additional advantages of the almost 'micrometer' adjustment of track lift together with a phenomenally low weight and ability to operate in stations and confined areas. Forward tilt into the ballast is eliminated because the load is carried centrally over the jack base.



*Weights only  
32 lbs*

CAPACITY 10 TONS • BASE AREA 80 SQ. INS.

HEIGHT 7" RAM DOWN • LIFT 4"



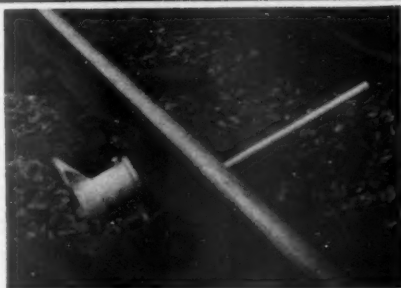
*One jack two jobs*

With a total capacity of 15 tons, it means that one jack weighing 32 lbs. only covers all a ganger's needs for both Plain Line Track as well as Points and Crossings.

## **ABTUS LTD.**

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PETTY FRANCE,  
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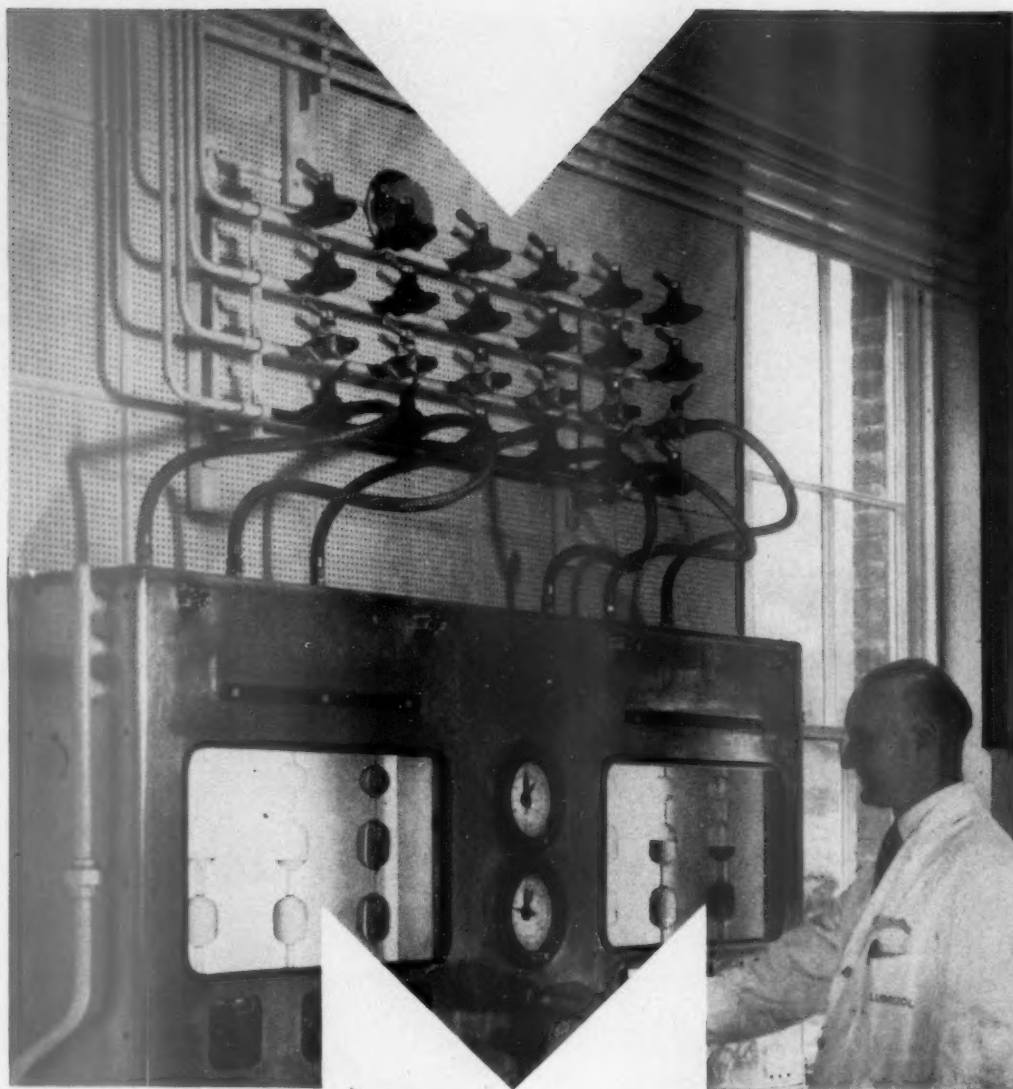
Telephone: Abbey 2312-3  
Cables: Abtus, Sowest, London



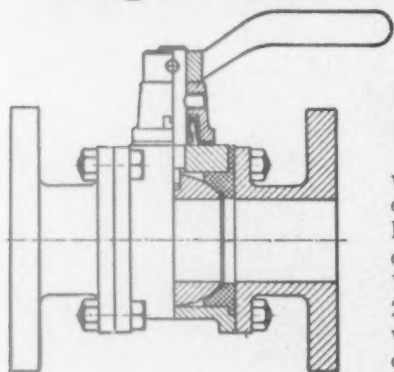
*Suitable for slewing*

Operated from under the rail a flat angle setting is possible which means more SLEW and less LIFT and yet as illustrated complete SAFETY.

Photographs by courtesy of British Railways.



## Emphasis on M Valves . . . for metering Fuels



### **SAUNDERS** M VALVES

with spherical plug and flexible sealing are mounted in batteries for each engine test rig in the Technical Laboratory of Lubrizol (Gt. Britain) Ltd., at Hazelwood, near Derby. Many types of internal combustion engines are tested with fuels treated with detergents and additives. The measurement panels with six Saunders T.P. shut off valves and 24 M Valves above have reduced leakage to nil and ensured functioning with complete accuracy. Valve body can be removed without disturbing end connections.



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## All clear for progress!

**Modern colour light signalling systems rely on AEI Cables**  
Current schemes on which AEI Cables are being supplied for British Railways include:

**Southern Region:** Some 90 miles of twin and multi-core signalling and telephone cables between Sevington and Dover. (For AEI-GRS Ltd.) Over 149 miles multicore signalling cables, mains cables associated with signalling and telephone cable between Paddock Wood and Ashford, Kent. (For Siemens & General Electric Railway Signal Co. Ltd.)

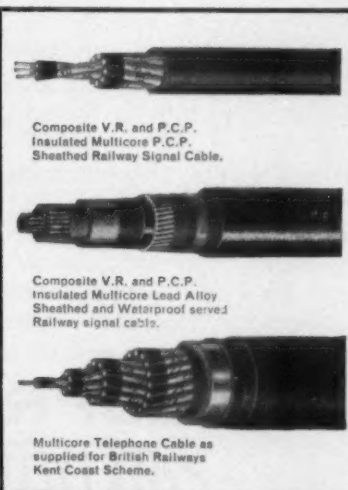
**Scottish Region:** 160 miles of multicore signalling and power signalling cables on the Glasgow Suburban electrification scheme. (For AEI-GRS Ltd.)

**Eastern Region:** Approximately 80 miles of power cables associated with signalling and VR/PCP signalling cables. (For Siemens and General Electric Railway Signal Co. Ltd.)

**AEI** also specialise in the installation of power cables for railway electrification. Recent installations include 25 kV solid type cables at Manchester/Crewe and 25 kV oil-filled cables at Glasgow, 33 kV oil-filled cables on London to Brighton main line and at Stratford/Shadwell. They also supply track feeder cables and cables for locomotives—in fact AEI can supply any cables required for railway electrification.

### CABLE DIVISION

Associated Electrical Industries Limited  
51/53 Hatton Garden • London EC1 • Telephone CHAncery 3822

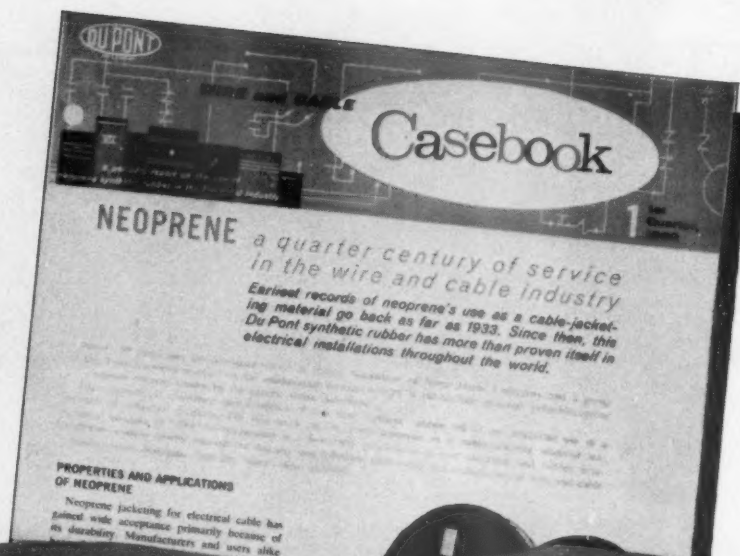


Composite V.R. and P.C.P.  
Insulated Multicore P.C.P.  
Sheathed Railway Signal Cable.

Composite V.R. and P.C.P.  
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supplied for British Railways  
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# HOW TO SOLVE YOUR WIRE AND CABLE PROBLEMS



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### IMPORTANT NEW APPLICATIONS

This new series of *Wire and Cable Casebooks* will keep you up-to-date on all the latest uses of Du Pont neoprene — in switches, connectors, accessories and the many other products being developed for today's rapidly growing electrical industry.

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POSITION.....COMPANY.....  
ADDRESS.....  
CITY.....COUNTY.....



Photo by courtesy of British Railways (London Midland Region)

Investigation into track-spraying techniques has led to the development of two prototype sprayers. Completely modern in conception, and designed with the needs of today's diesel electric railways in mind, this equipment brings chemical weed control out of the steam age.

Registered Trade Mark of J. R. Geigy S A Basle Switzerland

# WEEDEX

**cuts maintenance costs  
on railways**

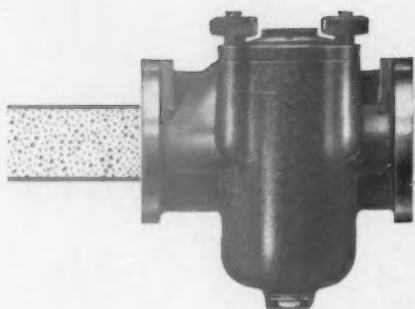
An intensive research programme carried out at the Chesterford Park research station on British Railways' weed problems has proved Weedex to be the cheapest, safest and surest way of maintaining weed-free tracks and installations. An annual treatment is an outstanding investment.

*Weedex is sold overseas as Simazine 50W*

FISONS

PEST

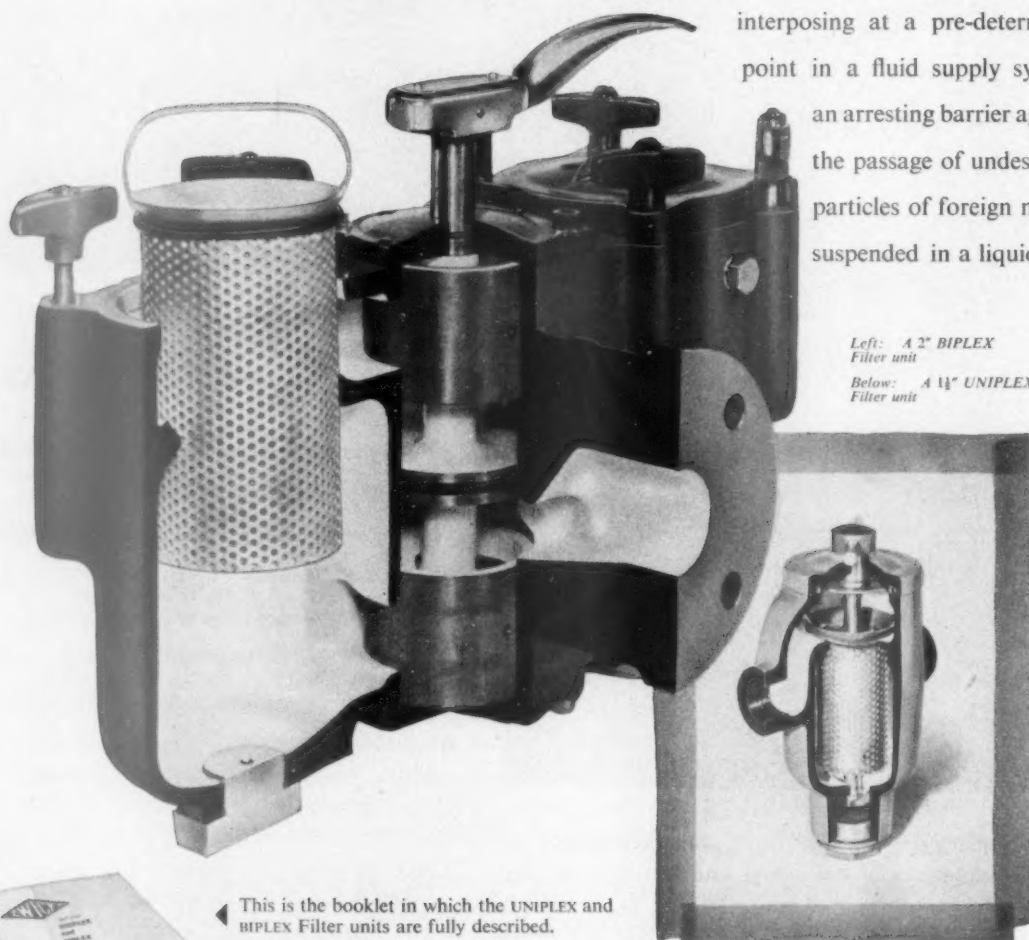
CONTROL



## Zwicky PLEX Filters are NEW

... but they are new only in the sense that they are an advanced design of a type of filter unit of which ZWICKY LTD. have many years' design, manufacture *and* operating experience.

The designs of the single-chamber UNIPLEX Filter and the double-chamber BIPLEX Filter represent a distinct advance in the technique of interposing at a pre-determined point in a fluid supply system, an arresting barrier against the passage of undesirable particles of foreign matter suspended in a liquid.



Left: A 2" BIPLEX Filter unit

Below: A 1½" UNIPLEX Filter unit



◀ This is the booklet in which the UNIPLEX and BIPLEX Filter units are fully described.

Please address enquiries and requests for the UNIPLEX and BIPLEX Filter booklet to:

**ZWICKY LIMITED • Buckingham Avenue,  
SLOUGH • BUCKS**

TELEPHONE: SLOUGH 21201

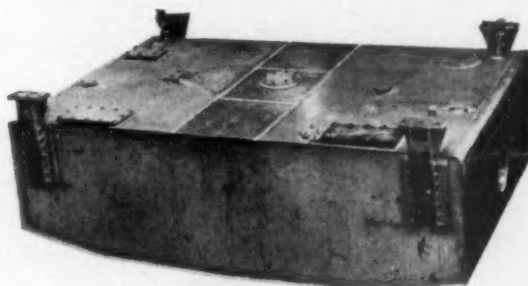
TELEGRAMS: ZWIKLIM SLOUGH



## Weight on your mind?

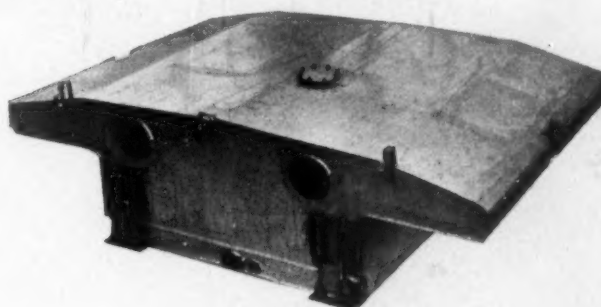
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If you've a weight-saving or heat-transfer problem on your mind, bring it to Marstons.



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Marstons offer a comprehensive design and production service for locomotive components — from complete cab assemblies in light alloy and laminated plastic to element-type radiators in light alloy or copper-brass.



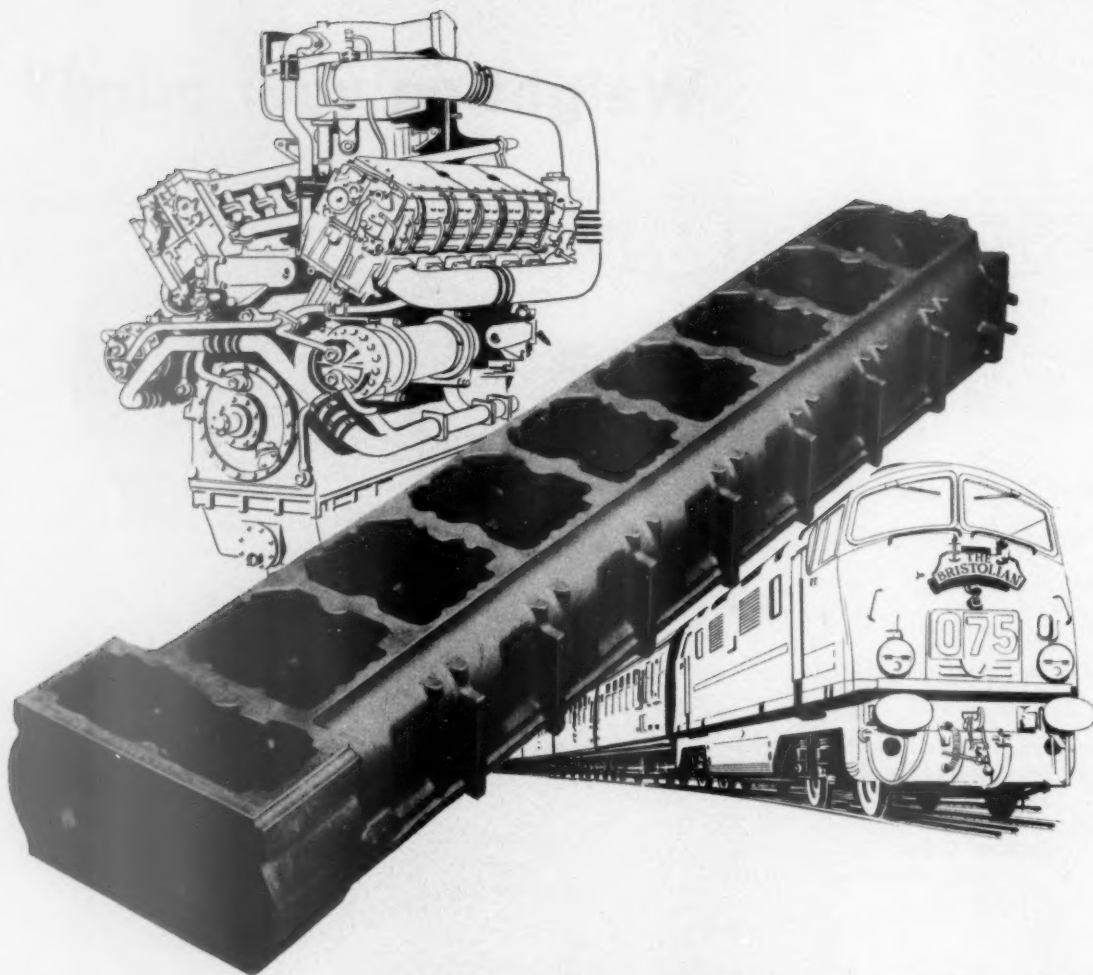
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Long experience in this field enables Marstons' designers and technicians to find the quickest and best route to the solution of your problems.



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a subsidiary of Imperial Chemical Industries Ltd.



### Britain's fastest express uses Harper Castings

The rocker covers on the Bristol Siddeley Maybach Diesel Engines are cast by Harpers and these 1200 h.p. engines power the new D800 class locomotives which haul such crack trains as the Cornish Riviera Express and the "Bristolian"—Britain's fastest Express.

Originally made as a series of steel castings welded together, these rocker covers are now cast in one piece in Harper-Meehanite, which is less expensive and cleaner in appearance. They weigh 410 lb. each.

*Harper quality covers Grey Iron, Spheroidal Graphite Iron and Meehanite castings, metal pressings, machining, enamelling and sub-assembly work. Also makers of the famous Beatrice Oil Heaters and Harper Housewares.*

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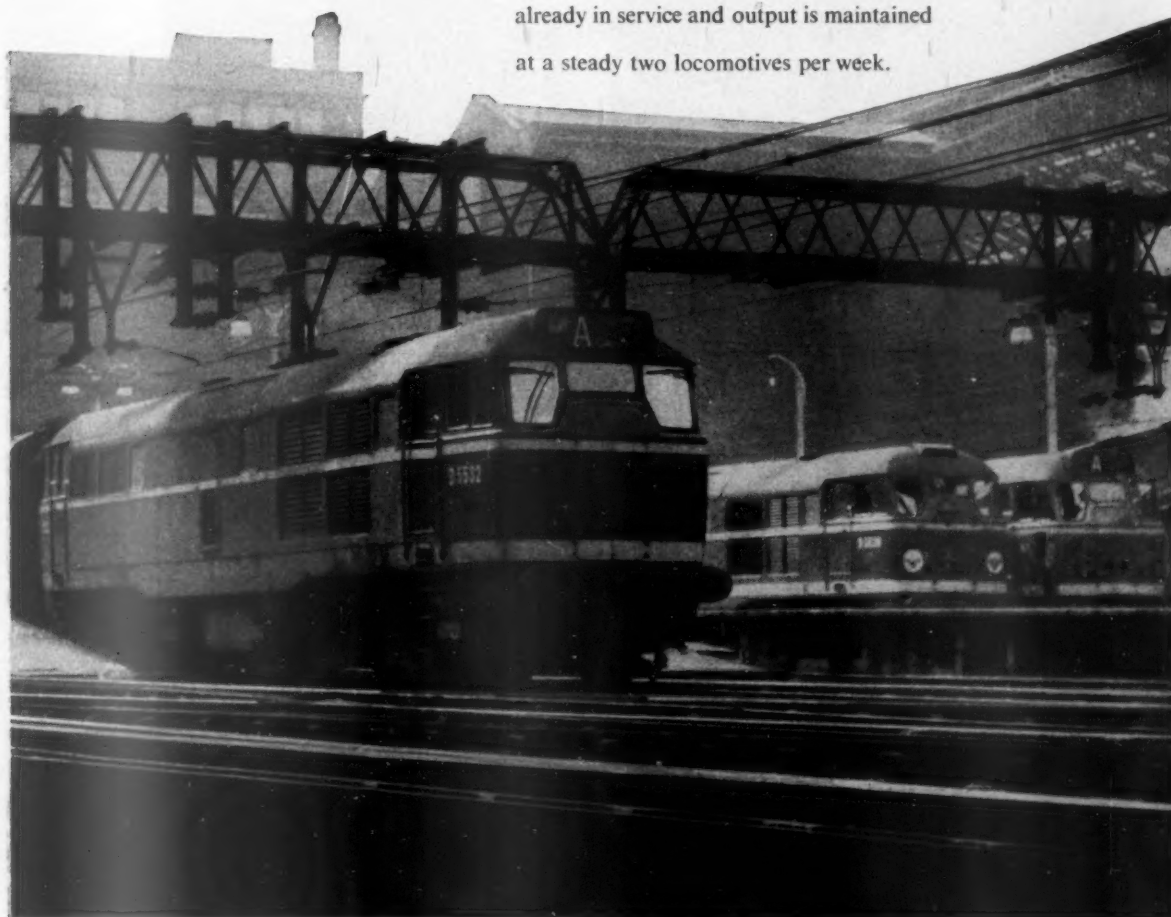
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226 Brush Type-2, 1250-1365-1600 H.P. Diesel Electric Locomotives have been ordered for British Railways, over half of these are already in service and output is maintained at a steady two locomotives per week.



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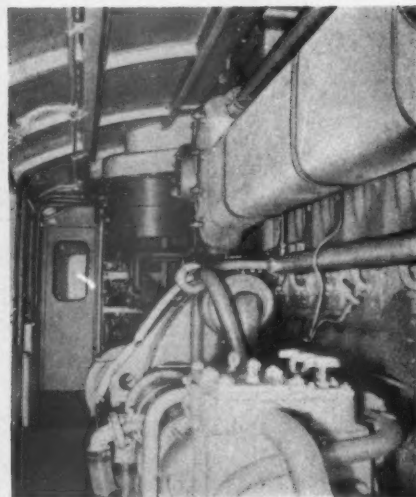


## A 450 ton load at 70km/h !

Thailand's narrow railway gauge (1 metre) called for special consideration in the design of 950 H.P. diesel-electric locomotives for her State Railways. Maximum permissible axle load was 12 tons, and the restricted body width entailed a special arrangement of mechanical and other parts.

The hot humid climate under which the locomotives would operate required particular attention to be paid to the cooling system, and to the electrical insulation. Then there were the operator's requirements—450 ton loads at 70 km/h on level runs; 400 tons at 12 km/h on grades of 25 per mil.

Hitachi built them. Hitachi has the know-how, having built one of the world's largest narrow-gauge diesel-electric locomotives (1,900 H.P.) and several 1,400 H.P. units for the Japanese National Railways. 5 units have already been delivered to Thailand and 25 more are being built in Hitachi factories, whose experience will keep them rolling for many years to come.



**Hitachi, Ltd.**

Tokyo Japan

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# ISOTHERMOS

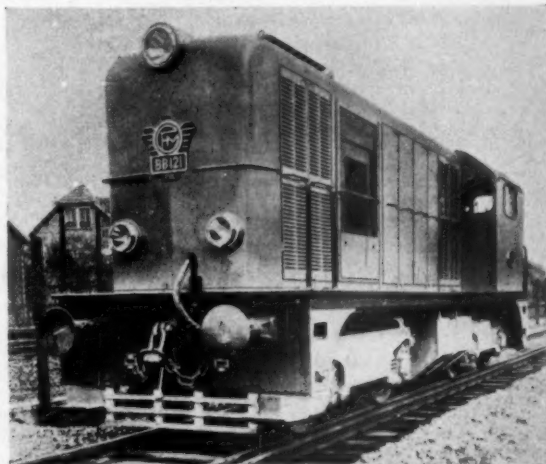
ISOTHERMOS axleboxes are in the forefront of the technics of railway journal lubrication, having gained THE WORLD SPEED (205 m.p.h.) and ENDURANCE (405,000 MILES) records when fitted to French National Railways Electric Locomotives.

*Isothermos modern mechanically lubricated axleboxes of the "Athermos" type meet all requirements of modern railways.*

Due to their robustness, easy and cheap maintenance, the Isothermos axleboxes of either inside or outside design are ordered in increasing number for the fitting of all types of Diesel Locomotives.



French National Railways: 25 Co Co 120-ton—2,000 h.p. Diesel Electric Locomotives for passenger trains.



Bo Bo 730/935 h.p. Diesel Electric Locomotive "Overseas" type.



450 h.p. Diesel Electric Locomotive fitted with inside Athermos axleboxes.



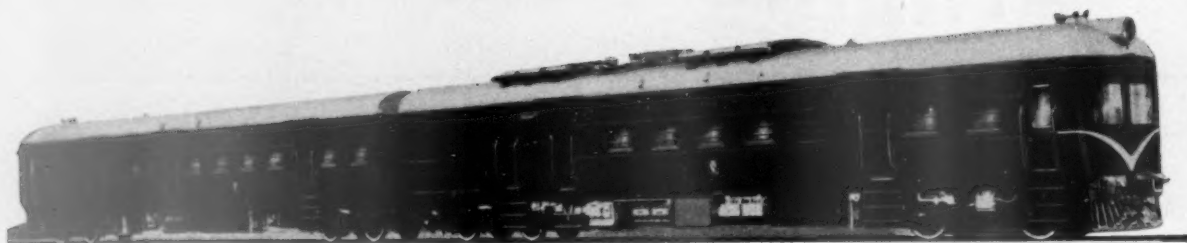
"Marine CEMFAR" 400 h.p. Diesel hydro-mechanical Locomotive.

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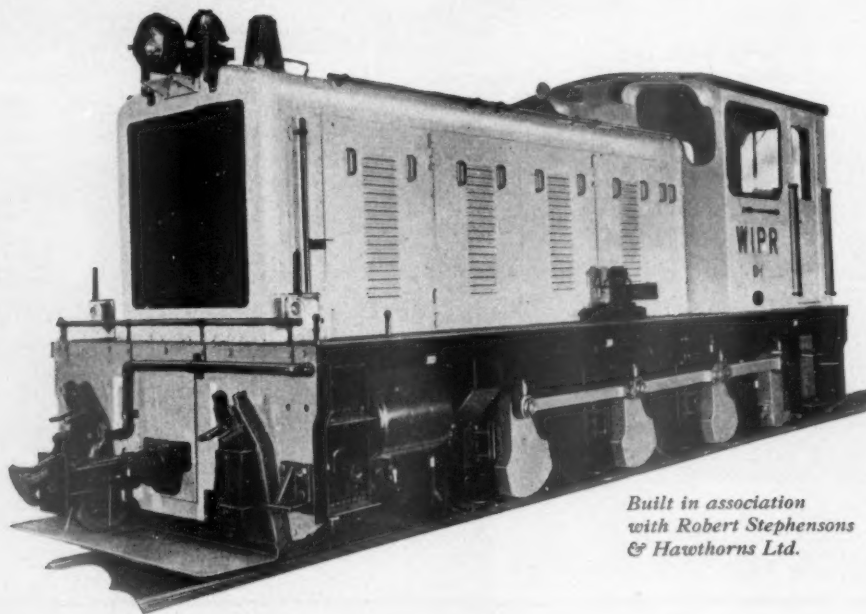


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The Birmingham Railway Carriage  
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## WITH MECHANICAL OR HYDRO-MECHANICAL TRANSMISSION

The upper illustration shows one of two Twin Car Units shipped this year to the Nigerian Railway Corporation, equipped with twin underfloor engines totalling 400 h.p. and multiple-speed epicyclic transmission with automatic control. The lower illustration is one of a number of 30-ton metre gauge Drewry locomotives recently shipped to Portuguese India, for freight and passenger duties.

## AND LOCOMOTIVES



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## STC and Railway Modernization

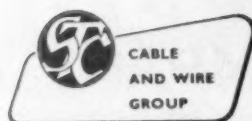
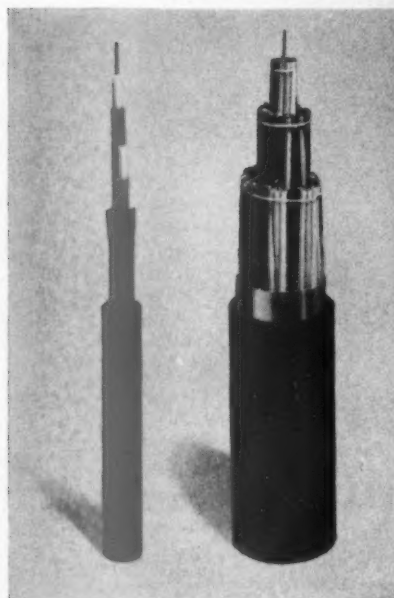
### Three more STC communication installations for British Railways, Western Region

STC Type 163 Coaxial and Audio-frequency All-Plastic cables have been manufactured and supplied for the above Western Region communication modernization schemes.

Left: STC 2-core Type 163 Coaxial cable.

Right: 27 Quad polythene insulated and sheathed telephone cable.

Laying STC Polythene Coaxial and Audio cables alongside railway track, for direct burial into the ground, between Llanharan and Llantrisant. Each pair of coaxial cores has a capacity of 300 speech circuits. Expanded polythene is used for the coaxial dielectric and solid polythene for the insulation of the audio pairs and for the overall sheaths.



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Illustration shows treatment of  
Sproughton Sidings, Ipswich.  
Photo, by courtesy of Chief Civil  
Engineer, Eastern Region,  
British Railways.

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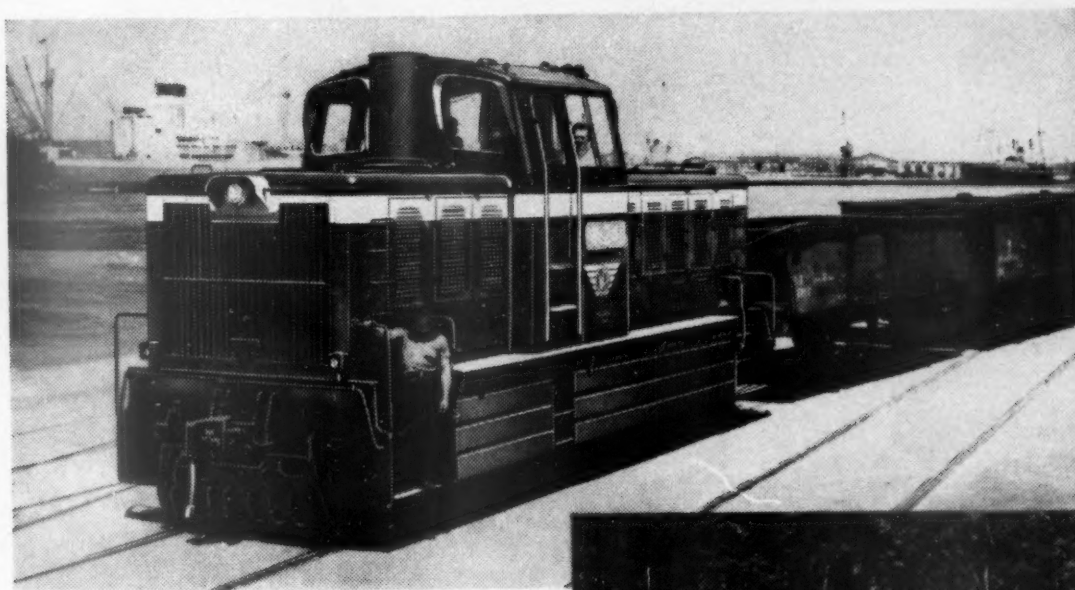
Also at Trent Lane, Nottingham. Tel.: Nottingham 52397.

Morel Buildings, Stuart Street, Cardiff. Tel.: Cardiff 28561



# TULLOCH

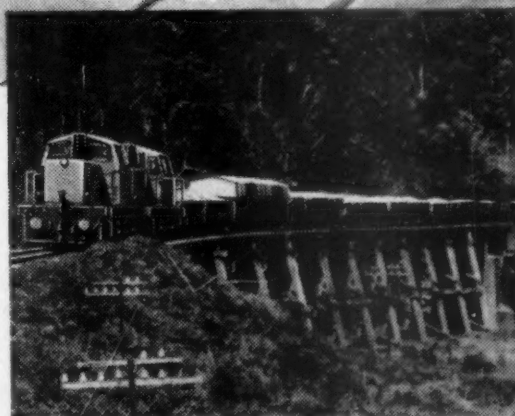
## DIESEL-HYDRAULIC LOCOMOTIVES



Above: 700 H.P., 0-6-0 Tulloch-designed, Tulloch-built Diesel Hydraulic Locomotive for shunting and transfer work, one of an order of twenty-five for the Victorian Government Railways, Australia. The design incorporates 12 cylinder Mercedes-Benz diesel engine, Krupp hydraulic transmission and axle gear and Behr hydrostatic cooling plant.

At right: 350 H.P., 0-6-0 Tulloch-designed, Tulloch-built Diesel Hydraulic Locomotive for shunting and secondary line operations on the Tasmanian Government Railways, Australia. Power is supplied by a Rolls-Royce 8 cylinder turbo-charged diesel coupled to Krupp hydraulic transmission.

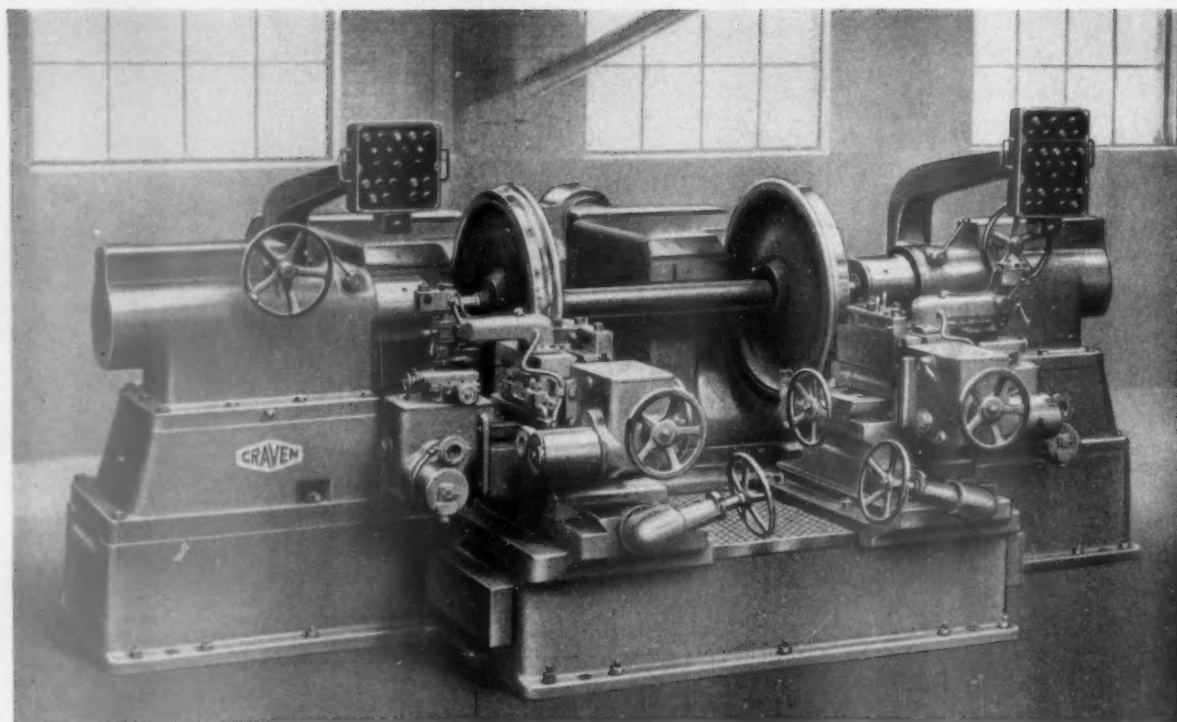
A feature of Tulloch design is roomy cab layout with extreme simplicity of controls.



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*Floor-type Friction Roller Drive Wheel Lathe***FLOOR-TYPE AND PIT-TYPE****WHEEL LATHES**

**WITH FRICTION ROLLER DRIVE  
AND ELECTRICAL PROFILING**

Recent developments in Craven Railway Wheel Lathes utilise carbide tools for re-turning diesel and electric traction wheels. The floor-type lathe deals with dismantled wheel sets, either with or without their axle-boxes in position: the pit-type lathe re-turns wheel sets in position on the vehicle. The drive is by two pairs of hydraulically-loaded friction rollers—one pair to each wheel—giving a balanced, self-contained thrust upon the wheel rims to transmit a high driving torque without risk of distortion. Tread and flange form profiling is by Craven patent fully-automatic, single-point electrical profile copying equipment.

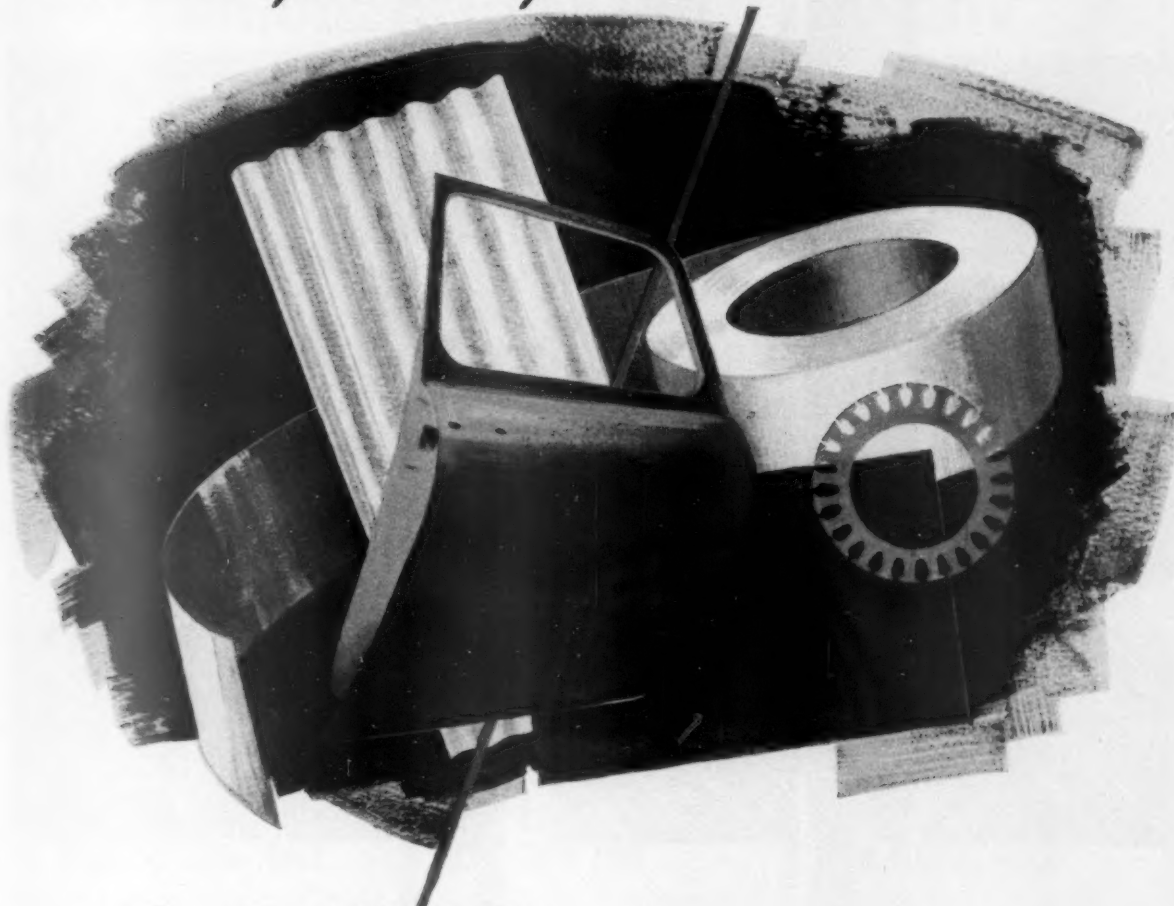
Patent Nos. 849291 & 833326,  
and application No. 29749/59.

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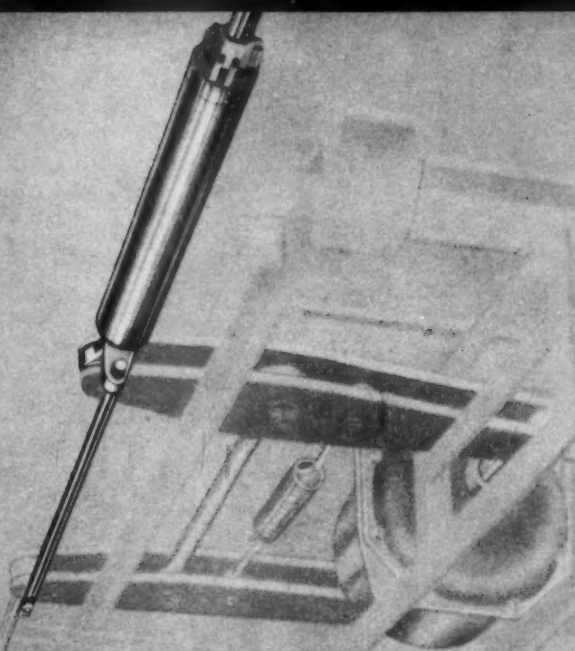
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# SAB DOUBLE-ACTING RAPID-WORKING BRAKE REGULATOR TYPE DRV



## IN MORE THAN 50 COUNTRIES

Although the productions of the SAB Company cover a wide range of empty/loaded braking devices, the product most closely associated by railway engineers with the symbol SAB is the double-acting, rapid-working SAB Brake Regulator.

SAB Brake Regulators have been delivered to leading Railways in more than 50 countries all over the world. In most of these countries, SAB Brake Regulators have been adopted as a standard component of the brake equipment. They have gained a reputation for efficiency and reliability, resulting in an ever increasing number of installations on all types of railway vehicles.



## BRAKE REGULATOR TYPE DRV

The most advanced member of the SAB slack adjuster family is the fully automatic, double-acting, rapid-working Brake Regulator Type DRV, the result of more than 40 years of specialised experience of automatic slack adjustment.

The DRV regulator is built into the brake rigging as part of a pull rod. It rapidly takes up or pays out slack, thus maintaining correct brake block clearances. In addition it contributes to easier replacement of worn brake blocks, no manual adjustment being required after the operation. The DRV Brake Regulator also makes it possible to use a simple mechanical empty/loaded braking device.



## TECHNICAL ASSISTANCE

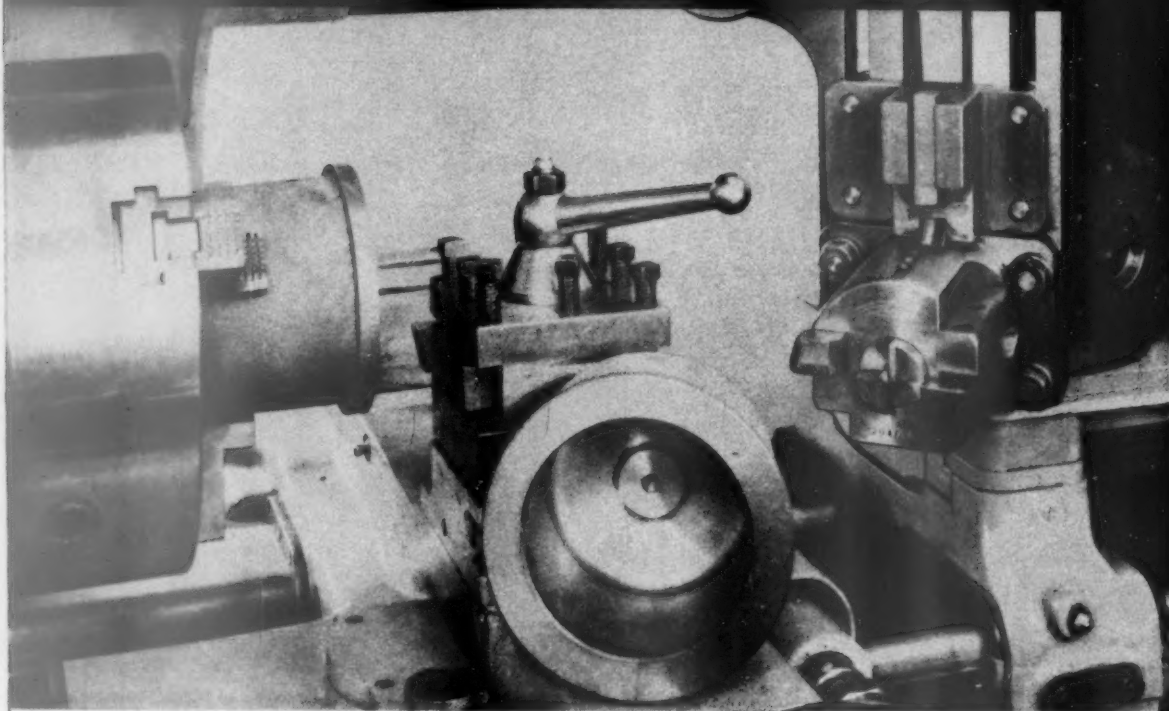
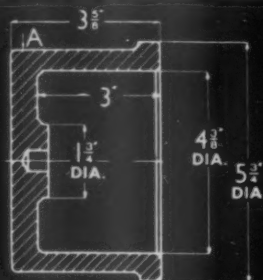
Whenever brake slack adjustment and empty/loaded braking problems require an effective solution, it is advantageous to consult SAB.

The SAB Company has built up an important service organisation which, with its expert knowledge, is ready to deal with any problem relating to brake rigging and brake installation for all types of railway vehicles.

The SAB Service Engineering Department checks proposed brake rigging designs and provides detailed installation drawings as a service to customers. It also assists whenever necessary at the actual mounting on the vehicle.

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Tools.

DESCRIPTION OF OPERATION	Tool Position		Spindle Speed R.P.M.	Max. Cutting Speed		Feed	
	Hex. Turret	Cross-Slide		Feet per min.	Metres per min.	Cuts per inch	m/m per rev.
1. Grip at A	—	—	—	—	—	—	—
2. Bore $4\frac{1}{8}$ " dia., face bottom, form end boss and drill $\frac{3}{8}$ " dia. hole,	1	—	177	278	84.8	76	.334
Turn flange dia.,	—	—	119	180	54.7	Hand	Hand
Chamfer bore & flange	—	—	—	—	—	—	—
Finish face end	—	Rear	177	278	84.8	Hand	Hand
3. Remove from chuck	—	—	—	—	—	—	—

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with Preselective  
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**TURRET LATHES**  
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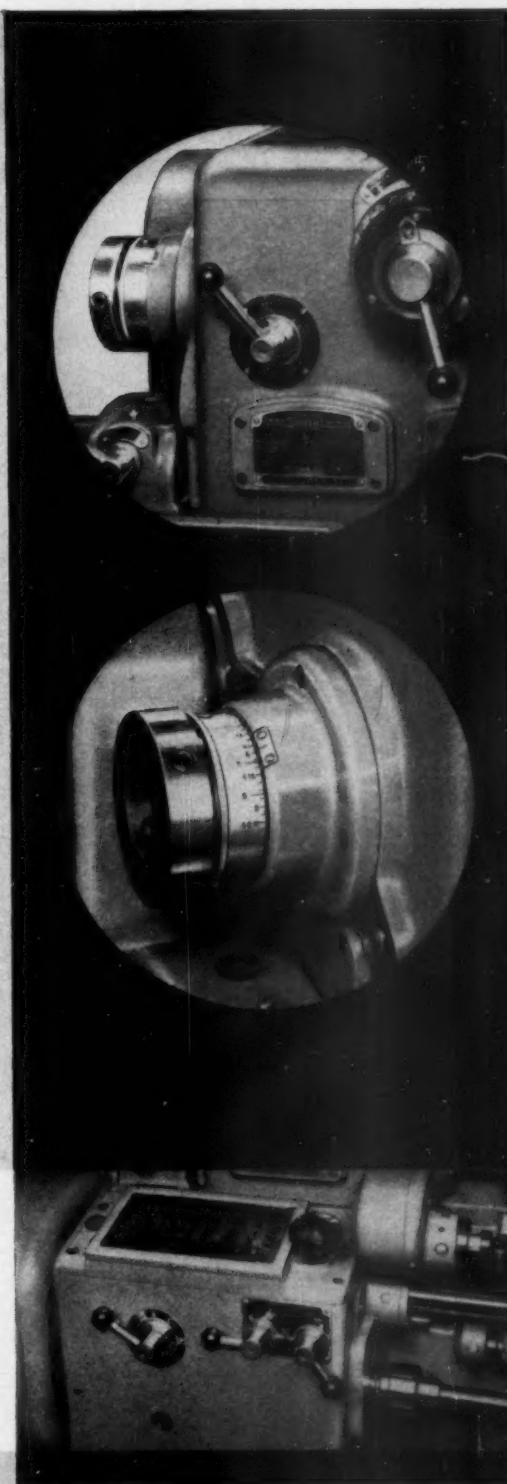
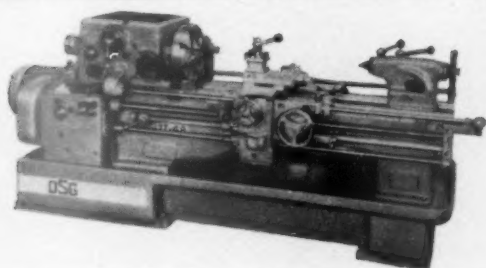
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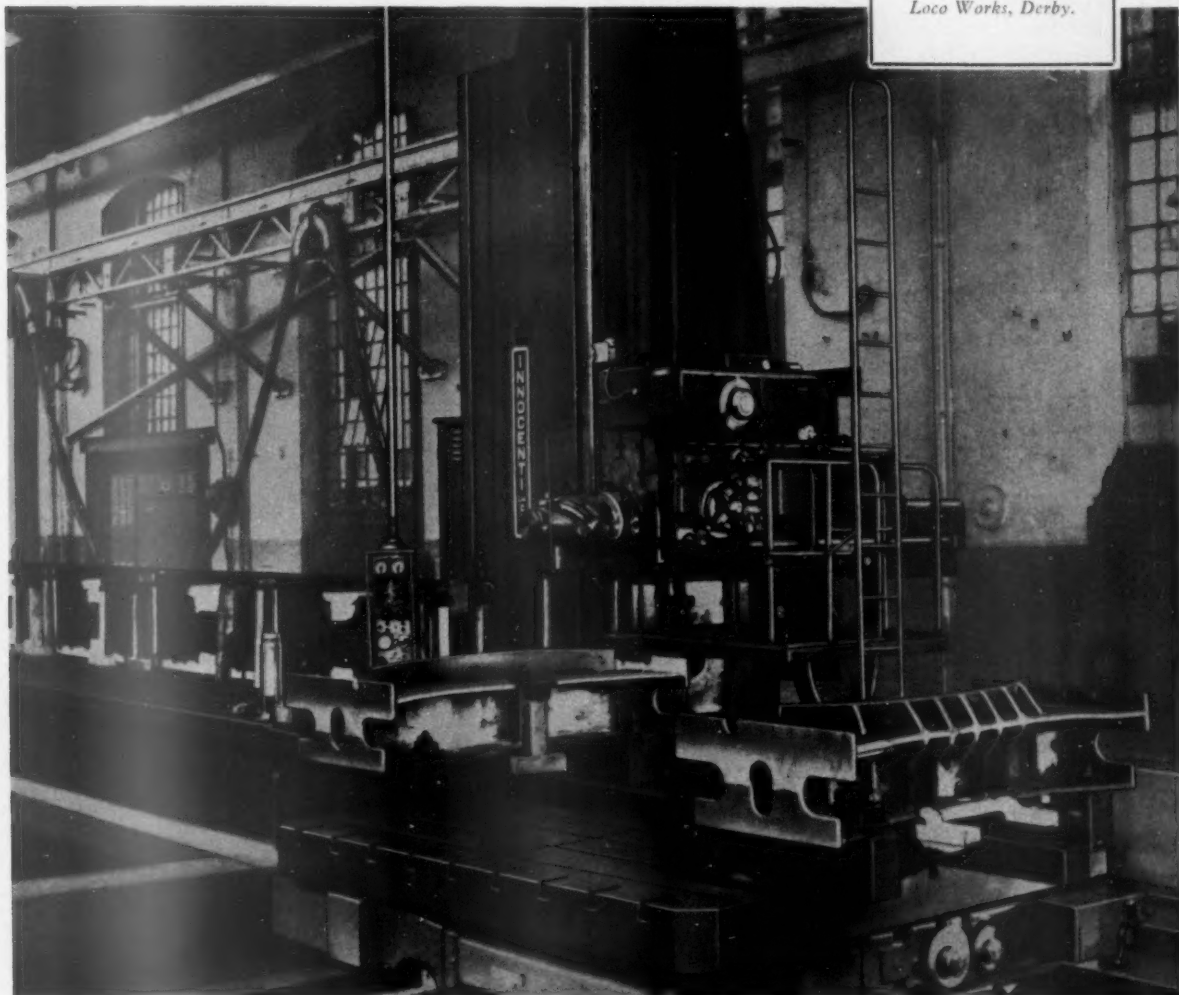
## Maximum power, precision and production potential . . .

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Machining of bogie quadrant assembly on rotary milling table of INNOCENTI-CWB Universal Precision Milling and Boring Machine FAF 95. Note Stretchers lined up for machining on second working station on floor plate.

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British Transport  
Commission,  
Loco Works, Derby.*



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## *Main Line Electrification going ahead on* **SKF**

The first electric locomotive to be built under the Modernization Plan for service on British main lines, which are being electrified at 25/6.6 kV., is equipped with **SKF** spherical roller bearing axleboxes. It is the first of 23 Type 'A' which together with 2 of Type 'B' are being supplied by A.E.I., with mechanical parts by Birmingham Railway Carriage & Wagon Company. These locomotives are designed for intensive 24 hours-a-day working, covering 200,000 miles per annum. For fast, smooth, trouble-free running, the first choice is **SKF**.



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A journal of Management, Engineering and Operation

VOL 114

FRIDAY MARCH 3 1961

No. 9

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## No economy in manpower

ONE of the more extraordinary features of the Government proposals for dealing with the British nationalised transport industry, as outlined in the recent White Paper, is the apparently profligate demands it will make on administrative manpower. The breaking down of the various constituents of the British Transport Commission can hardly be effected without some increase in personnel not only at the highest levels but also, and probably more significantly in numbers, in the intermediate tiers of the various organisations. No doubt in principle every effort will be made to avoid increasing staffs, but in practice it seems likely that this will prove very difficult of achievement. It is much more likely that a further impetus will be given to the operation—so well known and feared in industry—of Parkinson's Law. Decentralisation of control and executive responsibility within one large-scale organisation—the modern trend in commercial administration—is one thing.

Breaking off constituent parts of a whole and creating entirely separate and autonomous statutory boards—as for docks and the inland waterways—or companies—as for British Road Services, the Tilling Group, Scottish Omnibus Group, British Transport Hotels, Road Freight Shipping Services and Thomas Cook and Son, Ltd.—is quite another matter. These latter are to be grouped under the new holding company, but presumably they will lose the benefit of any staff economies which arise from common services available through membership of the Commission. Only time can prove whether such a cumbersome procedure can be justified by results, but it is difficult to see why it should be on the basis of normal commercial practice and experience. It will certainly give scope for empire building. As an exercise in disintegration the Government's plans are certainly worthy of world-wide attention. They will be watched with an interest approaching awe by some overseas national railway administrations who have achieved financial success by precisely opposite methods, but which have not allowed themselves to be diverted from the basic considerations of transport as a commercial proposition. Or is it just that their organisations have been devised by transport men with the objective of carrying goods and passengers on time and in safety?

## Electrical industry's initiative

THE lead which industry can give to Governments in promoting international trade by developing international standards and by other means has been stressed by Mr. S. F. Steward, Director of the British Electrical & Allied Manufacturers' Association. At a reception at the B.E.A.M.A. headquarters in London in connection with the British stand at the recent International Household Goods & Hardware Fair at Cologne, he maintained that there were many matters, including the development of international safety standards and methods of approval, in which industry must take and was taking the initiative. British electrical manufacturers, as he points out, have long-standing links with the electrical industries of Western Europe and attach great importance to strengthening these by playing an active part in European organisations representing the engineering industries. The electrical and mechanical engineering industries of the 13 countries of Western Europe are working closely through ORGALIME (Organisme de Liaison des Industries Métalliques Européennes) in which there are now no barriers between the two blocs, the European Free Trade Association and the Common Market. Co-operation of this kind and continuing improvement in efficiency in manufacturing, Mr. Steward believes, can do much to alleviate the effects of the tariff changes resulting from the Common Market.

## "Holiday Haunts"

NO TRAVEL literature published by railway administrations equals British Railways "Holiday Haunts" guides in combining the aesthetic with the practical or in wealth of information. The five volumes, four concerned with England and Wales and one with Scotland, this year contain the usual large number



of new photographs, well chosen and reproduced, of seaside and inland resorts and of the exterior and interior of trains, railcars, railway ships, and camping coaches. The guides are for those who travel—or take or send their motorcars—by rail. Besides describing resorts, with lists of hotels and so on, they give detailed information on railway facilities, well illustrated. There are comprehensive lists of ordinary fares and particulars, for instance, and particulars of holiday runabout, excursion, and other reduced-fare tickets, baggage arrangements, conveyance of motorcars by car/sleeper and other trains, hire or self-drive cars at stations, meals in trains, camping coaches, and camping apartments in converted station buildings.

### U.I.C. public relations drive

QUICKER dissemination of railway information to the European press and television corporations; increased efforts to win public understanding of European railways' problems and public regard for railway achievements; wider publicity for the activities of the U.I.C. (International Union of Railways), and more rapid exchange of information between U.I.C. member railway administrations are considered essential by the Union. Accordingly, the Information Centre of the European Railways (C.I.C.E.), established by the U.I.C. in 1950, has been replaced by a European Railways Information & Publicity Centre (C.I.P.C.E.). Details were given last week. C.I.P.C.E. is divided into two sections. Duties of the Public Relations Section include contacts with the press and with television and similar corporations. A useful step is the replacement of the C.I.C.E. *Information Bulletin* by a service assuring more rapid exchange of information between member railways. The news given in the *Bulletin*, though of great interest to railwaymen, often was stale by the time it was passed on to the press and public. Continuation of the publicity campaign in the U.S.A., so as to tap the great sources there of tourist traffic on European railways, is one of the main tasks of the Publicity Section.

### Pullman Car Company's good year

INTRODUCTION of three all-Pullman services worked by multiple-unit diesel-electric trains, and a considerably increased trading profit made 1960 a notable year for the Pullman Car Co. Ltd. The five sets, incorporating new standards of design, equipment, and decoration, were built by the Metropolitan-Cammell Carriage & Wagon Co. Ltd.: two for the "Midland Pullman" of the London Midland Region between St. Pancras and Manchester, and three for the "Birmingham Pullman" and "Bristol Pullman" of the Western Region between Paddington, Birmingham and Wolverhampton, and Paddington and Bristol. The company's report for the year ended December 31, 1960, states that all these services are now well established and contributing to net profits. Gross receipts for 1960 were £1,028,476, against £901,613 for the previous year, and working expenses £851,555 (£755,788) so that the net profit of £176,921 represented an increase of £31,096. Fourteen of the 44 cars ordered for locomotive-hauled trains were delivered in the last quarter of the year. Encouraging comments on the décor have been received from passengers. These new cars are in Pullman trains between Kings Cross, the North, the North East, and Scotland.

### Voluntary vocational training

IN AN article in this week's issue, Mr. G. A. Weedon, M.I.Mech.E., M.I.Loco.E., describes the instruction voluntarily sought by motormen and provided by the Southern Region of British Railways. He stresses the pride of craft which has led the men to seek the knowledge which not only makes them more efficient, but makes their work more interesting. Regularly held competitions serve to keep up this interest, which is widespread throughout the Region, and which results in good

attendances at both classes and contests. In fact, response has been so good that, in many cases, lectures have been repeated to satisfy demand: a situation which shows that, given training facilities, staff will take advantage of them. The Southern has received good backing from the British Transport Commission in this work; lecturers, films, and equipment have been provided, and visits to places of technical interest are regularly arranged.

### Removing a Portuguese bottle-neck

THE Portuguese Railways modernisation plan includes doubling of the single line into Oporto and removal of the bottle-neck caused by the Maria Pia bridge over the Douro between Vila Nova de Gaia and Campanha. The bridge is the only link within Portugal between the lines south and north of the Douro. It is a graceful 520-ft. two-pin arch, designed by the French engineer Gustave Eiffel. When opened in 1877 it was rightly regarded as one of his masterpieces. Although well maintained, it is insufficient for the heavy loads of today; this has resulted in the Alco A1A-A1A diesel-electric locomotives, which normally work the Lisbon expresses between Entroncamento and Vila Nova de Gaia, being replaced at that station by lighter motive power, and in a 12 m.p.h. restriction over the bridge. A consequence has been the retention in service north of the Douro of some remarkable elderly locomotives and rolling stock. Among them are outside-cylinder 0-6-0 tender engines built by Beyer, Peacock & Co. Ltd. in 1878, which haul Oporto suburban trains of four-wheel coaches. They must be among the oldest British-built locomotives still performing duties for which they were originally intended.

### Mineral traffic in Southern India

THE increase in recent years of iron-ore and to a lesser extent manganese-ore traffic in South India has been embarrassing the port authorities, and several sections of the Southern Railway have been worked to capacity. The ore is exported from Madras, Bombay, Vizajapatam, Masulipatam, and Cocanada. Bombay and Vizajapatam have sufficient capacity and prospects of expansion, but the other three ports have felt the pinch, Madras in particular. There have been new facilities there both for the export of ore and also for the import of coal from Calcutta for railway and industrial use in Southern India. A new mechanised berth to the south of the harbour was recently opened with an adjacent yard 1,600 ft. long and 100 ft. wide equipped with two transporter cranes running its full length. The capacity is about 5,000 tons a day, worked in three shifts. Vizajapatam has a capacity of some million tons a year, but it is fed more from Central India over the South Eastern Railway than from the South.

### British Standard for rolling stock tyres

THE British Standards Institution has issued the third part of its specification for wheel pairs for locomotive and carriage and wagon tyres. Considerable care has been taken to ensure that this new British Standard caters for the special requirements of overseas railways as well as the needs of British Railways. The specification (B.S. 3117: Part 3) gives preferred leading dimensions and contours for finish-machined, rough-machined, and as-rolled locomotive, carriage, and wagon tyres suitable for wheel centres conforming to Part 2 of B.S. 3117. A list of preferred sizes for diameter on tread, internal diameter, thickness and width is included. Tolerances necessary for the satisfactory fitting of the tyre on the wheel centre are given. The publication of this standard completes the set of British Standards for components of wheel pairs for locomotives and rolling stock. Part 1 for axles, Part 2 for wheel centres and monobloc wheels, Part 4 for the Gibson ring type fastening and Part 5 for machining and assembly have been issued.

## Coach heating and air-conditioning

THE comfort of passengers is, in the opinion of the International Union of Railways, one of the three main principles on which attention should be concentrated in the evolution of passenger transport, the others being speed and safety. (We are tempted to suggest for consideration a further principle—punctuality—which for many travellers ranks of greater importance than speed.)

In the issue of February 24, 1961, we reviewed some recent aspects of research work undertaken by the Office of Research & Experiments for the U.I.C. Reference was made to the investigation initiated in the problems of heating and air-conditioning passenger rolling-stock, and it is felt that the steps so far taken for this research merit a more detailed review.

The organisation considered that the right approach to the problem was by analysing the various factors causing discomfort so far as heating and ventilating were concerned, and thereby determining the directions in which improvements should be made. A series of track tests was carried out, but the results were inconclusive because of the impossibility of repeating tests under exactly similar climatic conditions, and the difficulty in altering one test condition without affecting some of the others.

It was therefore decided to build a special test station to carry out experiments under atmospheric conditions which could be selected and maintained for any desired length of time. The installation was constructed at the Research Institute for Heating, Cooling & Fluid Dynamics, situated in the Arsenal district of Vienna, and consists of two chambers, each large enough to accommodate a coach of the longest length and cross-section, and a power plant.

One of these chambers, which is equipped with suitable thermal insulation, is designed for static tests. The climatic conditions, which can be simulated, range in temperature from  $-40$  deg. C. to  $+50$  deg. C., and in humidity from 10 to 100 per cent at  $+50$  deg. C., and from 50 to 100 per cent at 15 deg. C. Any conditions within these limits can be obtained irrespective of the prevailing external temperature.

The second chamber, which is to be used for dynamic tests, is provided with a more comprehensive set of test equipment. To reproduce the airflow experienced by a coach running at speeds up to 120 km.p.h., a single, large fan supplies air to the test chamber, while specially-designed aerodynamic devices are fitted to the ends of the coach to produce the correct airflow along the side-walls of the coach. The same temperature and humidity ranges are available as for the static tests, except that in this case the minimum temperature of  $-40$  deg. C. is only obtainable at low wind speeds, and in addition, a reproduction of solar radiation is provided.

During the tests, it is intended to keep in operation the heating or air-conditioning system with which the coach under test is equipped. The energy required for this purpose, either in the form of steam or electricity, is supplied from the test plant. As may be appreciated, the power supply for a test installation of this nature has to be provided on a large scale, particularly as both test chambers may be in operation at the same time. For producing low-temperature conditions, six refrigerating machines are installed. The air-flow fan for the dynamic test chamber is nearly 4 metres dia, and its maximum output is about 250 cu. m. per hr. For this output the energy consumption is about 300 h.p. The heating and moistening of the air account for a further demand on the power supply, the heating capacity being 260,000 K.cal. per hr. and the moistening installation needing 500kg. of steam per hr. Various auxiliary equipment has also to be provided for.

The test station is equipped with an elaborate system of instrumentation. Apparatus is provided for measuring temperatures in the coaches, in the test station, in certain parts of the heating and air-conditioning equipment, and on the exterior surfaces, for measuring air-speed, humidity, and

pressure, and for measuring the energy consumption of the coach heating and air-conditioning systems. Special apparatus measures the degree of comfort in the coaches. Because of the various electrical systems adopted by different railway administrations for coach heating and air-conditioning, a comprehensive electrical system has been installed, which is capable of supplying power at any of the voltages, either a.c. or d.c., likely to be encountered. It is understood that the test station will shortly be put in operation. The results of the investigation will be awaited with interest, and it is hoped that they will enable significant improvements to be made in coach design to enhance passenger comfort. The ease with which the comfort of a coach can be disturbed by the opening of a door or window is only too familiar.

## Supplying technical information

FEW people realise the difficulties of translation of technical matter from a foreign language. A rendering reads smoothly and seems to convey what the author means; this may obscure a triumph in ascertaining the meaning of one who writes his own language badly. The staff of large organisations such as British Railways who demand and receive from their research sections clear surveys or digests are often ignorant of the complexities of the collection and assessment of technical information. The latter, moreover, is often called for at short notice; speed in assembling from many sources facts and recorded opinions is a requirement of most technical research or intelligence services.

The scope of these problems is made clear by Miss Joan Ritchie, Assistant Librarian, and Mr. B. R. Byrne, Principal Scientific Officer, of the British Railways Research Departments in London and Derby respectively, in their paper to the Institution of Locomotive Engineers on February 21. They wrongly disparage the printed word when they state that "reading can never be as effective a medium for the exchange of ideas as talking together." As attendance at conferences is restricted, written proceedings, as they point out, are important; but apart from this, verbal discussion, even in a common language, fails more often than does written work to convey precise meaning except in the most straight-forward matters. Hence the importance of documentation, best maintained by specialists in that art.

The rôle of professional associations such as the Institution of Locomotive Engineers in providing a selective and critical means of publishing is stressed. As the published deliberations of one such body are insufficient, the locomotive engineer for instance must, according to the authors of the paper, take in "at least one general engineering journal, three or four specialist journals in the subject field, and, preferably, one general scientific journal." The enthusiast will arrange also to scan a wide variety of publications quickly, reading thoroughly only a small proportion of their content, but storing up, in his mind and in an index, ideas and impressions; and he will require access to well-executed abstracts, if only for material in unfamiliar languages.

Among the many matters mentioned by Miss Ritchie and Mr. Byrne is the provision by an information service of a general survey of a complex subject. They suggest that a request for this be best answered by providing the last published survey, plus the authoritative articles in the field published since. If no survey has been produced, the most authoritative articles published over a number of years may be offered. If the volume of material is so large as to make it uncertain which of the relevant papers are most suitable, an annotated bibliography is the best provision in the first instance. A selection is then made by the enquirer. Detailed technical knowledge, they maintain, is not necessary for this service: a good knowledge of sources is invaluable. Only if the information officer is technically qualified in the subject concerned should he try to summarise the published material. Ignorance may lead to omission of apparently unimportant detail or to



wrong emphasis. A further duty of the information department, the paper states, is to relate the standard of the information to the standard of the user. The tempo of production in railway workshops and the steadily increasing level of technical training make it desirable that foremen and others should have ready access to the latest information in a form suited to the need for application to their problems. If nothing of a suitable standard is available, the treatise should be re-written, or its content communicated in suitable terms.

The bane of the translator, it is rightly observed, is the author who cannot write. The translator must meet "the challenge offered by authors who have never paid their native language the compliment of learning it." This demands exercise of "that feeling for words which lies at the heart of literary composition together with the insight which conjures inspired solutions to crossword puzzles." Technical translation requires much more than a search in a dictionary for equivalents of special terms. Some dictionaries, moreover, such as that of railway terms in five languages, published by the International Union of Railways in 1957, are comprehensive. Even so, meanings often are hard to determine. Besides accepted terms, many authors use, and perhaps invent, technical jargon. Worse than that is obscurity, ranging from the intentional vagueness of the experimenter wishing to suppress details of his method to the results of untidy thinking or even of plain ignorance. The translator must think clearly and have a good knowledge of the subject.

An appendix to the paper deals with machine-aided translation. Space does not allow further mention, but this complex technique seems unlikely to be applied in the relatively restricted field of railway terms, at least for some time.

### Railway research

THE scope and purpose of the Research Information Division of the British Transport Commission or Railway Research service, are shown by its Director, Mr. C. E. R. Sherrington, in his paper read recently to the Canadian Railway Club, Montreal. The organisation began in 1924 as a joint enterprise of the four main-line railways and the Metropolitan Railway, with Mr. Sherrington as Secretary. After nationalisation it became part of the British Transport Commission, and in somewhat enlarged form was given the title of Research Information Division, though the name Railway Research Services also was preserved. After the war the International Union of Railways (U.I.C.) set up a Special Committee to pool the sources of information and documentary material between member railway administrations. The chairman was provided by the (British) Railway Research Service. Amongst the committee's achievements is a monthly documentation bulletin in French and Spanish, replacing the (British Railways) Research Service bulletin in English; a five-language dictionary of railway terms; and inauguration in Paris of the U.I.C. Documentation Bureau. The Special Committee concluded its activities at the end of 1960. The work of the Research Service during the war of 1939-45 in supplying information on railway matters of strategic interest was of the utmost importance to the cause of Britain and her allies. In addition normal work was carried on, and the R.R.S. monthly *Bulletin* never missed an issue.

Information is classified by the Research Service under 250 headings. Geographical classification is on the Dewey system, adjusted to cover individual railway administrations. The index cards last year carried 300,000 items. The library is comprehensive. Nevertheless the staff is small, which facilitates allocation of duties. The original conception of correspondents, paid for information sent, was discarded at an early stage in favour of exchange of material with other official railway organisations. Close liaison was established with railways throughout the world, and personal contacts with railwaymen of many countries have been of great assistance. Information sometimes must be supplied at very short notice. At

the end of 1925 the Service had to report, within two weeks, on all aspects of coal movement by rail in Belgium, France, and Germany. At that period also the British Government was considering ratification of the Washington Convention on an 8-hr. day for railwaymen. Information collated by the Service established the impracticability of applying this to certain grades; Britain did not sign, and our railways were saved some £12 million annual additional wage costs. In 1928, when it was desired to initiate a budgeting system, studies were undertaken of the methods then used by the Canadian National and some U.S.A. railways. A year later evidence had to be assembled for the Government Channel Tunnel Committee. In the same year much work was done in furnishing evidence required by the Government committee on A.T.C.

During 1930 many data were collected for the Weir Committee on main-line electrification, and this resulted in knowledge which proved of great avail in later years; it seemed clear for instance that the financial justification for electric traction depended largely on single manning of the motive power unit. This information incidentally was used by the Canadian railways in considering the manning of diesel-electric units. A major success was the recommendation to the London & North Eastern Railway to re-design White-moor marshalling yard for retarder operation, using the Frolich rail-brake. The entire scheme, based on visits to the German State Railway yard at Hamm, was agreed in six weeks, and resulted in the first retarder-equipped yard in Britain, followed by the Hull Inwards Yard of the L.N.E.R. and by Toton Yard of the London Midland & Scottish Railway. A method of mechanised cleaning of passenger stock, introduced in Britain by the Southern Railway, originated in the installation at Bercy (Paris) of the former Paris Lyons & Mediterranean Railway, on which the Research Service reported. Fishplates with two bolts were adopted, for a period as standard, on many British lines, the germ of the idea being based on a chevron design installed on the then Chemin de Fer du Midi (France). Double-filament lamps for colour-light signals were installed as a result of a survey of results on the Santa Fe Railroad, and rail oilers were employed by the Great Western Railway as a consequence of experience analysed on the Chicago Great Western, following the bends of the Mississippi River.

British railways were pioneers in the development of containers, a road-railer vehicle, the progressive system of rolling stock construction, and its adaptation to repairs. These matters, and rates structure, freight classification, demurrage, incentive bonuses, suggestions schemes, and the operation of air services by British railways have been the objects of study, recommendations being made where necessary. Questions of internal organisation are a constant subject of inquiry. Relationship with the State, road competition, co-ordination with road transport, port appliances and facilities, and hotel problems, restaurant-car design and restaurant facilities all have been and are being studied.

### Ulster Transport Authority

THE difficulties under which the Ulster Transport Authority, of which Mr. G. B. Howden is Chairman, has been operating in recent years were aggravated during the 12 months ended September 30, 1960, by the disturbed industrial situation in Northern Ireland. This prevailed over a considerable period during which the U.T.A. normally would have been working at optimum capacity. A heavy increase in labour costs resulted from national wage awards. The wet summer, more particularly in contrast with that of 1959, caused some loss of traffic. Increases in rates and fares were in operation only during the latter part of the financial year.

The annual report describes the vigorous action taken to increase efficiency. This well-produced document itself typifies the enterprising spirit. The front cover, illustrated on page

263, depicts four aspects of U.T.A. activity. The layout is pleasing, and illustrations of railway and other activities are included in the text for the first time.

The falling-off in railway revenue, of about 2 per cent compared with 1958-59, was in accordance with the recent trend, but it was more than offset by reductions in working expenditure. This was accomplished despite the higher wage levels and costs of materials and stores. Revenue from road passenger services rose by 1½ per cent, because of increased traffic and of fare increases; but the combined effect of this was nullified by higher costs of labour and materials, so that net receipts were 28 per cent down. Road haulage revenue rose 8 per cent, mainly due to the increased volume of cross-Channel traffic by the ferry services from and to Belfast and Larne; the benefits of this also were offset by higher costs of labour and materials. The trading deficit for the year, including rents and other items, was £51,499, compared with net receipts of £49,696 for the preceding 12 months.

In every aspect of its activities, the report states, the Authority has to contend with constantly growing competition "in the face of much popular prejudice and misconception, while receiving little encouragement in several quarters where a better understanding of the position could not unreasonably be looked for." Nevertheless the U.T.A. in 1959-60 carried more passengers and goods and its hotels and catering services did more business than in the previous year. Railway passenger journeys and goods tonnage declined on all sections: the lines formerly owned by the Northern Counties Committee of the London Midland & Scottish, by the Belfast & County Down, and by the Great Northern Railways. The principal trading results were as follow:—

	1958-59	1959-60
<b>Receipts</b>	£	£
Railway passengers	1,395,088	1,365,711
Road passengers	3,739,558	3,796,919
Rail and road parcels, baggage and mails	513,439	541,246
Rail and road freight	2,947,660	3,084,584
Hotels and catering	656,879	707,946
<b>Total</b>	<b>9,252,624</b>	<b>9,496,406</b>
<b>Expenditure</b>		
Rail and road	8,546,049	8,839,959
Hotels and catering	647,374	701,318
<b>Total</b>	<b>9,193,423</b>	<b>9,541,277</b>

The financial position, as explained in the report, is out of perspective in relation to the trading activities, because of the loan charges to the extent of £524,192 mostly arising from the association with the former Great Northern Railway and imposed by the Acts of 1953 and 1958. The total deficit for 1959-60 was £466,356, an increase of £81,953. The obligation on the U.T.A. under the Transport Act (Northern Ireland), 1958, under which the merged undertaking must, not later than September 30, 1964, be in a position to meet all its financial obligations and thereafter continue to do so, was accepted on the understanding that the inflated capital representing the railway assets would be written off, and also the large sums advanced between 1953 and 1958 to the G.N.R. Board in connection with its revenue losses. The effect, up to September 30, 1960, of this failure to implement what was believed to be the intention of the Government has already cost the Authority £632,000 in respect of additional loan charges, relating exclusively to the G.N.R.(I.) capital and advances in respect of its revenue losses. In addition, the U.T.A. has incurred in the two years a loss of about £320,000 on railways taken over from the G.N.R. Board.

In each year from 1956, including the year under review, the U.T.A., despite heavy losses annually incurred in working the railway system as a whole, has earned a profit varying from £302,000 to £58,000, an average of £160,000 per annum towards its loan charges, which sum would more than have sufficed for loan charges on the revised basis. Possible economies arising from the merger of the G.N.R. and U.T.A. have not yet been fully realised. An examination is in progress of the scope for possible modernisation, further adoption of diesel traction, and other economies on the railways.

Diesel continued to be the principal motive power for railway passenger traffic, and was used to a very limited extent for goods. On the Belfast-Bangor line of the B.C.D.R. and on the former N.C.C. lines, the proportion of train-mileage worked by diesels increased in 1951-60 from 10 to 77.3 per cent. On the lines taken over from the G.N.R. nearly 47 per cent of train-miles were diesel-operated last year.

At the end of last summer, passenger services were suspended for the winter between Coleraine and Portrush. Twelve stations and halts were closed during the year. The Cookstown Junction to Kilrea and Coalisland to Cookstown lines, which had been open for goods only, were closed for all traffic on October 1, 1959, and are abandoned. Passenger services between Lisburn and Antrim were withdrawn on September 12, 1960.

## American experience of diesel power

FROM A CORRESPONDENT

**A** RUMOUR has been spread abroad recently that the U.S.A. railroads are not satisfied with the results of the universal adoption of diesel motive power. It is strange that not a hint of discontent has appeared in the score of annual reports which come to hand in March and April through the courtesy of friends across the Atlantic.

Curiously, the coal roads favour diesel traction. One-eighth of all coal raised in the U.S.A. originates at mines served by the Chesapeake & Ohio. In its 1959 report Mr. M. I. Dunn, Vice President (Operations), stated that 10 years ago the C. & O. had one of the finest steam locomotive fleets in the world; now in its stead were more than 1,000 diesels, and if 1959 traffic had been handled by the 1950 engines, fuel and repair costs alone would have been from \$25 to \$30 million higher.

The Norfolk & Western, which operates 2,700 miles of road in the Pocahontas coalfields, was the last large railroad to substitute diesels for its massive steam locomotives. Through the changeover, coupled with the Virginian merger, the N. & W. has the highest earnings (before charges) of any U.S.A. railroad—\$60.8 million at the end of last November. Its 1960 operating ratio was slightly less than 60 per cent.

The Illinois Central is another railway whose main source of revenue is coal. Years ago it did a great deal to advance the Mid-West coal mining industry. Slow in adopting diesels for freight working, it yet owned 612 diesel units by the end of 1959. In reporting the delivery of the last batch of diesels the President, Mr. Wayne A. Johnston, said that they would, "together with those acquired in previous years," enable him to make substantial savings in train operation.

The Nickel Plate Road, operating over 2,000 miles in the industrial area between Buffalo and Pittsburgh on the east and Chicago and St. Louis on the west, had a 6.5 per cent rise in freight traffic in 1959, and a 27 per cent advance in net income. It still had 44 steam locomotives on hand at the end of 1959, but relied on 397 diesels for traffic movement and placed orders for 15 more to be delivered by June, 1960. The diesel fleet accounts for its low operating ratio of 71 per cent.

The Southern Railway was one of the first to install diesels on the whole of its 7,000-mile system. In 1959 it moved 66.4 million tons for an average haul of 222 miles and held its operating ratio at 67.6 per cent, increasing efficiency by putting into traffic 23 up-to-date diesel units of 2,400 h.p. The longest railway in the United States, the Santa Fe, also acquired 69 more diesels of the same power, making an all-diesel stock of 1,128 locomotives. The strengthened fleet raised the average speed of passenger trains to 50 m.p.h. in 1959 and the speed of freight trains to 24.7 m.p.h., reducing by one or two days freight transits between Chicago and the Pacific Coast. The Santa Fe operating revenues in 1959 totalled \$633.8 million, the highest in the history of the company. Its annual report attributed major credit for the result to the improvement in freight services, which would have been impossible without the development of diesel motive power.



## LETTERS TO THE EDITOR

THE EDITOR IS NOT RESPONSIBLE FOR THE OPINIONS OF CORRESPONDENTS

### OBTAINING A SMOOTH-RUNNING BOGIE

February 20

SIR, May I comment on the article in your January 6 and 20 issues?

Regarding the limit of static deflection which could be accommodated in wheel *plus* bogie suspension, a figure of 10 in. (or 60 cycles per min.) was given. I suggest that rides could be even softer if either variable rate springs or load levelling were used. Variable rate springs are quite simple to design and manufacture, and an approximation to constant frequency suspension can easily be obtained. Load levelling is more costly, but equally feasible. Because of these possibilities I feel that the static deflection is unsuitable as a measure of suspension softness, and that the use of the natural frequency gives a more accurate picture of the situation.

In the drawing in your January 6 issue of the damper installation on the bogie, a spring is shown in series with the damper to absorb small suspension movements without the damper coming into operation. Although I agree with this in principle, I do not think that a coil spring is the best way to absorb this initial travel. As progressive rubber stops are advocated elsewhere in the article, I am surprised that this solution was not proposed for this application; also I suggest that softer mounting rubbers for the damper, perhaps of a new design, could well satisfy the requirements. The main objection to the use of a coil spring is that a hydraulic knock could occur when the damper eventually is brought into operation. If only one soft damper mounting is used, it is advantageous to fit it at the end of the damper with the lower inertia, *i.e.* piston rod end, to minimise the possibility of the damper body resonating with a suspension vibration.

Thank you for printing a most informative article. I trust that the interest now being shown in rolling stock suspension will result in the adoption of more modern designs, with consequent improvement in smoothness of ride.

Yours faithfully,

D. A. AVNER  
Project Engineer, Suspension

Girling Limited,  
Kings Road, Tyseley,  
Birmingham, 11

### THE FUTURE OF RAILWAYS

February 16

SIR, In his letter in your January 13 issue, Mr. T. A. Germaine asked how railway traffic could be catered for during the period of conversion into motor roads. Much of the task could be accomplished at a relatively leisurely pace whilst rail services continued, including any necessary widening of embankments and overline bridges, and trimming back of cuttings. Much preparatory work could also be carried out on access roads, lighting, and alterations to station and depot buildings and underline bridges. All this would resemble the engineering work usually associated with electrification.

Only during the period of actually replacing the track by a road surface would it be impossible for public services over a particular route to continue. Because it is repetitive, road making is particularly suitable for a high-degree of mechanisation. On Contract 2, for example, of the M.1. motorway scheme it was found possible to lay 1,200 ft. of reinforced concrete for a 26-ft. wide carriageway in 11 hr. During this phase of conversion the work no doubt would be carried on 24 hr. a day, seven days a week. The continuous nature of the task over a period of several years would make economic the use of a variety of highly specialised equipment. A conver-

sion rate for a two-track line, equivalent to about a mile a day, should be attainable so that by taking stretches of a few miles at a time, public road services might start generally within three or four weeks of termination of those by rail.

The operation would need careful phasing. The guiding principle might perhaps be to convert branch and secondary lines first, so as to build up through road routes alternative to the remaining main-line railways. From the latter traffic might then be diverted gradually to the new motor roads until the principal main lines could be released for conversion.

Dislocation of services would be less than might be supposed, for there are usually alternative railway routes between important towns. Where freight traffic could not be moved throughout either by rail or upon the roads converted from railways, containers might be used for merchandise and parcels. The main difference between this and the present pattern of container traffic would be the longer portion of movement by road. In other cases traffic could move over existing ordinary roads. Bulk traffic such as coal or minerals could be transferred between railway wagons and road vehicles by tipplers. The latter would be designed for speedy erection, dismantling, and re-erection elsewhere. Pools could be maintained of other special equipment for transferring goods; and of road passenger vehicles to facilitate movement where alternative through passenger services could not be arranged.

Conversion of railways into roads must cause temporary inconvenience, against which the great advantages must be weighed. It would provide in Britain, at a relatively low cost and without extensive demolition of property in urban areas, a system of motor roads of a completeness without parallel in the world. By diverting much traffic from the dangerous existing roads it would result in a reduction in road accidents. It would enable British Railways to be changed into a prosperous public transport authority which could meet the challenge of its competitors by offering service of unprecedented quality.

Yours faithfully,

"BENBOW"

### MONEY AND ENERGY WASTED

February 9

SIR, In your February 3 issue reference is made to two examples of the sort of thing that really ought to cause "surprise and horror" to Sir Toby Low.

Despite the addition of yet another stage in scrutiny of estimates, in this case by the Minister of Transport himself attended by all his minions, the re-building of Euston Station has got tacked on to electrification of the London Midland Region. Can the station not cope with traffic as it stands, even without the help which electrification undoubtedly will bring? If there is a case for re-building, is it so strong as to justify delaying for two years the fruits of electrification?

Dr. Curtis, in his paper on architecture, shows the malady which besets the British Transport Commission: its pre-occupation with matters of secondary importance. Where is the sense of proportion of an organisation that tries to improve the appearance of overhead lines (forlorn hope!) by hampering the engineers, already hard-pressed to make some progress with their work, with the "services" of a stylist? The latter, apart from the delay he must cause, can only have some effect by departing from the most economical layout the engineers would produce, and thereby increase its cost.

Yours faithfully,

W. SYDNEY

12, Salisbury Road,  
Bexhill-on-Sea

## The Scrap Heap

... and sometimes I just sits

When Sir Norman Kipping, the Director-General of the Federation of British Industries, opened the new library of Hatfield Technical College on February 21, he was shown special "thinking boxes"—kiosks where students can sit in silence and puzzle out their problems.

### Last of Persia's oldest railway

The long-threatened closure is reported of the oldest railway in Persia. This line, of metre gauge and only 5½ miles long, provided a passenger service between Teheran and the small town of Shahr Rey to the south. The shrine of Shah Abdul Azim at Shahr Rey is a place of pilgrimage on Fridays, when each seven- or eight-coach train used to be crowded. The railway was constructed with Belgian capital and opened in 1887. The original locomotives and rolling stock, always well maintained, remained in service until the end. The illustration shows one of the four 0-6-0T engines built by Ateliers de Tubize for the original opening; it was later converted to oil firing.

### 88-year wait for drink

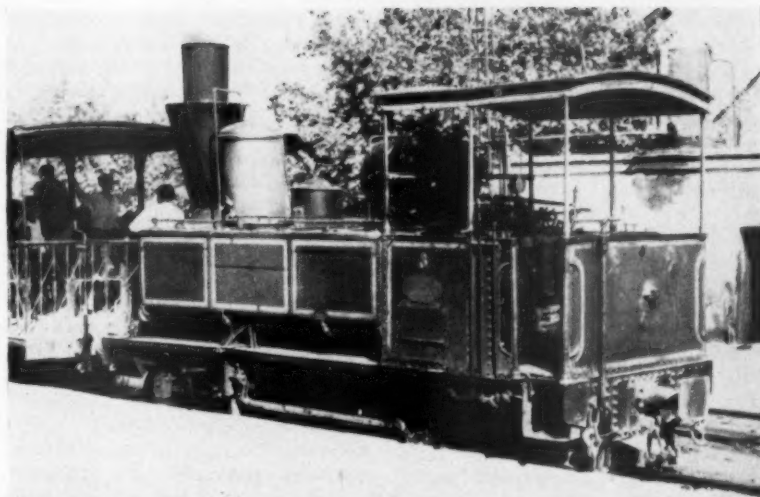
In April, villagers at Titley, Herefordshire, will no longer have to go more than three miles for a drink. Their pub, the *Stag*, is being reopened after being closed 88 years. The pub was closed after complaints in 1873 over the behaviour of navvies building the Kington railway line who regularly visited the *Stag*.—From "The Daily Mail."

### Great Eastern emblem

As a result of the amalgamation which took place in the early 1920's the Great Eastern Railway lost its identity. The emergence in 1957 of the Great Eastern Line as an individual part of the Eastern



Great Eastern lapel badge



"histo]

[P. A. Greenway

Oil-burning locomotive of the Shah Abdul Azim Railway, Persia, now closed

Region of British Railways has revived many of the things of which its employees were, and can still be, justifiably proud. Three contributions have been made towards this in the shape of a Great Eastern tie, the Great Eastern booklet, and the Great Eastern flag. A new contribution takes the form of a lapel badge.

### Bishop on the move

The train-spotting Bishop of Kingston . . . is becoming increasingly selective in his choice of holiday resorts these days. . . . In his library of ecclesiastical books is an old railway map. Each line the . . . Bishop has already travelled is marked in red ink. Once it was his ambition to cover the whole of Great Britain. Today, as railway modernisation gets under way, he is more concerned about spending his holidays where the whistle of steam engines can still be heard. His interest extends to driving engines—recently on the Bluebell line.—From "The Evening News."

### Unmasked

Before the opening of the Manchester-Liverpool railway in 1830, it was decided that the contract for the locomotives to be used on that line should be awarded on the results of an open competition with strict conditions for entry. Five engines were submitted for the trial: the *Rocket*, by Stephenson; the *Novelty*, by Braithwaite and Ericsson; the *Sans Pareil*, by Hackworth; the *Perseverance*, by Burstall; and the *Cycloped*, by Brandreth. The *Novelty* created great excitement by

nearly doubling the *Rocket's* speed of 13½ miles an hour, but came to grief on the following day. The *Sans Pareil* suffered irreparable disaster early in the proceedings, and the *Perseverance* moved at a steady but negligible pace. But, next to the final triumphant run of the *Rocket* at 33 miles an hour, the sensation of the competition was the discovery that the *Cycloped* was powered by a horse harnessed within the "boiler."

### Vertical take-off

Recent events in the London property market have not escaped my notice and I shall soon be in a position to reveal my plans for taking over the whole of London and rebuilding it under one roof. Delay is being caused by the reluctance of London Transport to sell me the Northern, Central, and Bakerloo Lines, which I would then dig up out of the ground and erect vertically so that the trains could be run up and down instead of to and fro. This is the basic idea of my architect Cloribusier.—Gerard Fay in "The Guardian."

### Ghost train?

Railway detectives have been investigating the case of an engine which puffed down the line all on its own. They were working on the theory that the 70-ton express locomotive was started on its unscheduled journey by someone with a frustrated desire to be a train driver. Or it might have started by itself. "Further tests will have to be made into that possibility," a railway spokesman is reported to have said.

# OVERSEAS RAILWAY AFFAIRS

FROM OUR CORRESPONDENTS

## INDIA

### E.C.A.F.E. study

Seventeen railway and other civil engineers representing Ceylon, France, India, New Zealand, Pakistan, the Philippines, Siam, the U.S.S.R., and the secretariat of E.C.A.F.E. (United Nations Economic Commission for Asia & the Far East) recently took part in a week's study under E.C.A.F.E. auspices. The study covered the methods used in building the bridge over the Brahmaputra at Pandu, Assam.

### Coal wagon allotment

To facilitate movement of coal from Bengal and Bihar coalfields, with loading on Sundays, 10-day allotment of wagons has been introduced, instead of daily allotment.

### Transit delays

A standing committee of operating and commercial officers has been set up on each of the eight railways to deal with delays to goods and parcels and devise remedies.

## NEW ZEALAND

### Shortage of goods wagons

Because of heavy seasonal primary produce traffic, the New Zealand Railways needs more wagons before it can adequately cope with the demands now

being made for freight conveyance by rail. The principal shortage is in the Auckland district where some 250 more wagons are required to augment the fleet of 700 based there. There is also an increasing demand for the conveyance of coal, fertiliser, and timber by rail.

## ARGENTINA

### Consultative committees

Consultative committees are to be set up in all departments of each railway. Three members of the non-graded staff are to be nominated by the management, and two members by the railway unions. The committees will be purely advisory, and make recommendations periodically to heads of departments. Re-organisation of the State Railways is to be studied by a committee of two delegates from the railway unions, and one member each from the State Railways management, the Ministry of Public Works & Services, and the Transport Secretariat.

### Access to Mar del Plata

The State Railway authorities have requested that the plan for re-modelling railway access to Mar del Plata and for the construction of a new terminal station there be given high priority.

### Strikes

Recent strikes have included one of 24 hr. by the guards on the suburban section of the D.F. Sarmiento Railway

in protest against disciplinary measures, and a partial strike by signalmen of the General San Martin Railway against the new classification decided on by the management.

### New type of C.T.C.

An American engineer, Mr. Sedgwick N. Wight, has offered a new system of C.T.C. of his invention to the State Railways. Details are not available, but it has been announced that the possibility is being considered of its adoption on the La Paz-Alto Verde section of the General San Martin and the Victoria-Pergamino section of the General Mitre Railways.

## BRAZIL

### Standard passenger coach

Construction is in hand of a standard type of long-distance passenger coach for the Central Railway at the Engenho de Dentro workshops.

### New equipment and works

Delivery of diesel-electric locomotives ordered for the Federal Railways early in 1960 is making good progress. Replacement of 300,000 tons of rails is now complete. New quarries for ballast and other civil engineer material have been equipped, bringing the total number in production to 43.

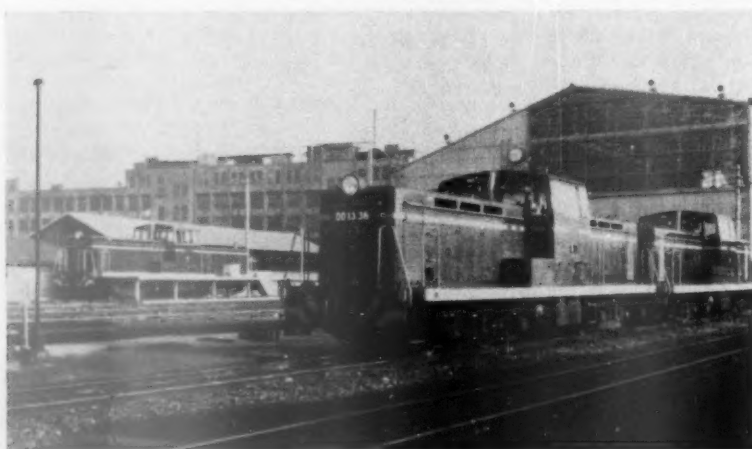
### Leopoldina electrification extended

Electrification of the Rio de Janeiro suburban section of the Leopoldina Railway has been completed to Penha, and work is in hand on extension to Caxias.

## SOUTH AFRICA

### Indigenous rolling stock construction

The first electric train ever to be produced in the Union, consisting of an electric unit and six all-steel coaches, has been completed by Union Carriage & Wagon Co. (Pty.) Ltd. The train was completed six weeks ahead of schedule. It is the first of 56 ordered by the South African Railways on a R19,000,000 (£9,500,000) contract with Union Carriage & Wagon, and has been built almost entirely out of South African materials. The train was officially handed over to Mr. D. H. C. du Plessis, General Manager, South African Railways & Harbours, at a ceremony at the factory



Japanese National Railways type "DD 13" diesel-hydraulic locomotives with twin power units, each with a continuous rating of 370 h.p., on shunting duties



on February 25. It will be used on the Peninsula suburban service in Cape Town. Union Carriage & Wagon is at present negotiating with the authorities in Rhodesia and Mozambique about rolling stock construction.

## RHODESIA

### Collapsible plastic covers

Rhodesia Railways has developed a new type of wagon cover called the Carcoon. This is a plastic fabric over a collapsible metal frame designed to protect motorcars in transit.

## CZECHOSLOVAKIA

### Electrification extension

Electric working will be extended from Valasské Mezířice to Puchov (40 miles) in time for the introduction of the 1961 summer service. This will leave a gap of

only 27 miles (from Puchov to Zilina) between the new electrification proceeding eastwards from Prague and the existing electrified section from Zilina to Spišská Nová Ves in Slovakia. The forthcoming closure of this gap will give a continuous electrified main line of 394 miles eastwards from Prague towards the U.S.S.R. frontier. The system employed is 3,000 V. d.c.

## WESTERN GERMANY

### Higher season ticket rates

Prices of season tickets have been increased. The 12-month ticket valid for the whole Federal Railway system now costs DM. 3,500, first class; a second class all-line 12-month season ticket has been introduced as an experiment, price DM. 2,600. All-line monthly seasons cost DM. 483 and 360, first and second class respectively. There are corresponding increases in the prices of monthly

tickets covering one of nine large areas (*netzkarte*) and of monthly and seven-day tickets for a smaller area (*bezirskarte*).

### Faster passenger services

Accelerations from May 28 include the "Parsifal" T.E.E. ("Trans-Europe Express") diesel train between Hamburg, the Ruhr, Cologne, Aachen, Liege, and Paris. Westbound it will run from Hamburg Hbf. to Aachen, 328 miles in 5 hr. Other trains to run to faster schedules are the "Helvetia" T.E.E. (Hamburg-Frankfurt-Basle-Zurich); the "Blauer Enzian" ("Blue Gentian") between Hamburg and Munich; and the "Adria Express" between Copenhagen, Munich, and the coast of the Adriatic. New stock is to be used for the "Rheingold Express" which runs by day between the Hook of Holland (in connection with the Harwich/ Hook night service) and South Germany and Switzerland and beyond; this train also is to stop at Baden-Oos, for Baden-Baden.

## PUBLICATIONS RECEIVED

*Go by Train in Europe* (Summer, 1961). This booklet contains abstract timetables of international passenger connections in much of Europe from May 28. It is published by the C.I.C.E. (Centre d'Information des Chemins de fer Européens) in Rome. The language is English. Apart from Prague and Sofia, which lie on routes included in the tables, no timings are shown to places behind the Iron Curtain—despite new services to Moscow. The booklet is obtainable from railway administrations. It is likely to be of most use to travel agents in countries outside Europe.

*Tesatest Dial Indicators*. The Tesatest dial indicator, manufactured by Tesa S.A., of Switzerland, is described and illustrated in a bulletin available through stockists or direct from Matchless Machines Limited, Tesa Division, 18, Bolton Street, London, W.1.

*Notes on Process Selection and Filler/Electrode Materials*. This pamphlet is published as Addendum 2 to Aluminium Development Association Information Bulletin 19, "The Arc Welding of Aluminium." Since publication in 1955 of Bulletin 19, much progress has been made with developments of the two inert gas shielded arc processes now known as TIG (inert gas tungsten arc) and MIG (inert gas metal arc). The addendum, which also takes into account developments of fine wire welding with the MIG gun, amplifies paragraphs of Information Bulletin 19 concerned with the choice of filler rod or electrode for welding given parent metals. The first part gives further guidance on choice of welding processes

and the second deals with the appropriate filler or electrode for welding pure aluminium to one of its alloys, or to dissimilar alloys; also for the welding of wrought to cast aluminium. Copies are available from the Aluminium Development Association, 33, Grosvenor Street, London, W.1.

*Summer Holidays in Great Britain and Ireland*. A wide variety of holidays in the British Isles and the Channel Islands is included in the well-illustrated programme of Thos. Cook & Son Ltd. and Dean & Dawson Limited. Amongst inclusive tours are cruises on canals and the Thames, and the all-in holidays in Scotland with travel by special train from major centres in the Midlands and North.

*North British Steel Foundry*. A booklet issued by the North British Steel Foundry Limited, of Bathgate, Scotland, describes the firm's products and services. They include machining facilities, supply of part-assemblies made up of steel castings conjoined by welding or bolting, and production under licence or similar arrangement, of complete plant, equipment, or machines. There is a guide for steel selection and a summary of chemical compositions and mechanical test requirements covering 31 steels.

*French Railways Travel Literature*. Well-produced publications in English obtainable from French Railways Limited, 10, Haymarket, London, S.W.1, and from leading travel agents include a booklet "Named Trains," illustrated in colour. Separate maps show the routes of internal and international services.

The booklet "France" and a folder, "See Paris and France," also illustrated in colour, feature many attractions for the holidaymaker. There are route maps of S.N.C.F. rail and motorcoach routes, and views of S.N.C.F. passenger trains. A folder, "Car-sleeper Expresses 1961," gives particulars of the car-sleeper trains during the holiday season between Boulogne and Lyons, Paris and Avignon, Paris and Biarritz, and Paris and Milan.

*Silicone and Silastomer products*. Midland Silicones Limited, of 68, Knightsbridge, London, S.W.1, has published lists of manufacturers of silicone electrical insulants and fabricators of Silastomer silicone rubber components. The two lists, one (C-19) for electrical insulating material suppliers and the other (K-11) for silicone rubber processors, are divided under headings such as "cable and wire," "flexible insulation" and "silicone rubber rollers."

*The Engineer Buyers' Guide*, 1961. London: 28, Essex Street, Strand, W.C.2. 8½ in. × 5½ in. × 1½ in. 978 pp. Price, 12s., post free. Over 35,000 names of firms, without addresses, are arranged in the buyers' guide section under some 2,700 classified headings, amply cross-referenced. A separate section gives postal and telegraphic addresses and telephone numbers. Trade marks and brand names are given in another section. There are lists of forthcoming engineering and industrial exhibitions in Britain and overseas; of associations and other bodies concerned with engineering; of national undertakings; and of U.K. agents for overseas firms.



## VOLUNTARY VOCATIONAL TRAINING among motive power staff

Pride of craft induces staff of Southern Region  
to seek instruction toward greater efficiency

by G. A. WEEDEN, M.I. Mech. E., M.I. Loco. E.

It is only during recent years, since the introduction of new forms of motive power, that British Railways has undertaken the formal training of the staff in the operation and fault-finding techniques so necessary in the successful introduction of the units or locomotives.

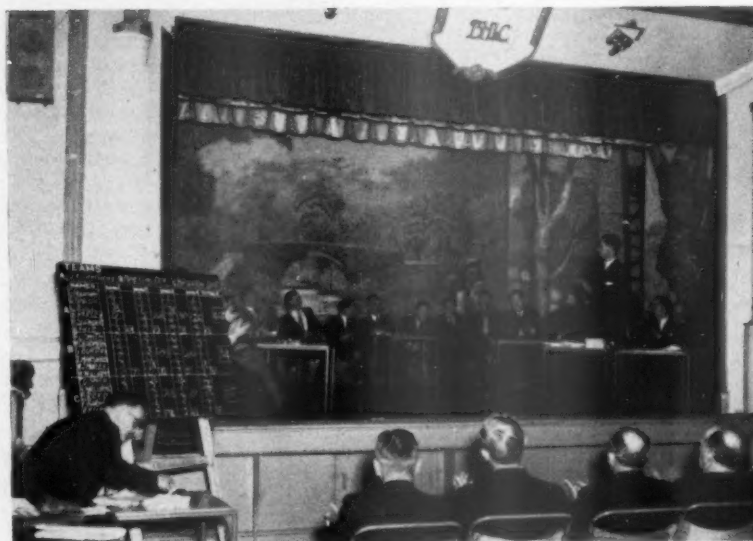
This training has been evolved after much thought and has been developed on standards laid down by the British Transport Commission to the Regions.

As far as steam traction is concerned, in this country the view taken is that the steam locomotive driver learns much of the skills of locomotive driving during the period he is an engine cleaner and locomotive fireman, by tutorage from the more experienced staff.

### Theoretical and practical examination

There is no doubt that this system produces good results, particularly as the standard is maintained by requiring each prospective driver to pass both a theoretical and practical examination. The examination is standard for British Railways. It requires the candidate to pass in rules, regulations, knowledge of the steam locomotive, fault-finding, and to demonstrate his knowledge by a driving test with the examining inspector.

Pride of craft and the expectation of this examination brought about a voluntary association of enginemen at motive power depots throughout the



First motormen's discussion group regional competition held May 7, 1959

country where technical education is given to mutual improvement classes.

Much of the instruction is given by experienced drivers and covers a wide range of subjects related to the steam locomotive and its operation. The success of these classes fluctuates considerably and is related to the promotional prospects of the firemen employed at the depots, as there is no doubt most of the

footplate staff who attend classes regularly are senior firemen who are hoping to pass the examination for driving.

The staff carries out this activity when off duty, and it is surprising, in view of the difficult turns of duty, that sufficient men can attend to make the classes worth while. In the north and in Scotland the movement is very strong, and there is a federation of mutual improvement classes which attempted to bring the classes together in one organisation, managed and controlled by the staff.

This voluntary vocational education on such a large scale surely is unique among industrial workers in this country and reflects the enthusiasm and pride in their job which exists among these men; this has been acknowledged by the British Transport Commission since its formation.

### Help from the Commission

Although some help was given to the mutual improvement class movement by the constituent railway companies in the form of buildings, equipment, and lecturers in specialised subjects, the Commission decided more should be done, although the voluntary association and control by the staff remains unaltered.



Typical exhibition of equipment used in motormen's discussion group lectures

Members of the staff who act as mutual improvement class instructors are sent on a teachers' course to a training school in Darlington, and specialised training in diesel traction is given on each Region to instructors on a voluntary basis, although diesel traction may not have been introduced at the depots concerned. This has been introduced to awaken interest and maintain morale at depots not yet involved in the new forms of traction.

As far as the Southern Region of British Railways is concerned, this training is undertaken at the present time at Eastleigh Motive Power Training School and consists of three weeks' full-time training to the following syllabus:—

1st week—Details of diesel engines; Fuel systems; Cooling systems; Pressure-charging; Transmission—gear boxes, etc.

2nd week—Electricity; Main and auxiliary generators; Traction motor; Control system; Fault-finding.

3rd week—Practical training on locomotives and trains.

The official diesel drivers' manuals and fault-finding charts are given to the class after the instructors have been trained.

#### Mutual improvement classes

The Commission also introduced in 1950 a mutual improvement class competition which takes the form of teams of drivers and firemen from individual depots competing on a District, Regional, Inter-Regional, and British Railways basis.

A shield and prizes are presented to the winning team.

A further attempt to encourage staff to belong to the mutual improvement classes has been the use of mobile instruction trains which consist of carriages fitted with models and sectional pieces of equipment from steam locomotives. Lecture rooms are also provided. The trains are accompanied by instructors and visit depots to a programme.

The introduction of diesel and electric traction on a large scale has meant that a considerable number of drivers of all ages has left the traditional motive power depots and has been stationed in comparatively small groups at signing-on points and inspection sheds.

The difference in the mode of work, the lack of traditional solidarity of depot life, and having passed not only the driver's examination but also the examination in the new form of motive power has meant that only the feeling of pride of craft has caused any of these men to form voluntary vocational associations in their new sphere.

On the Southern Region, where for some years there have been about 1,400 motormen driving electric multiple-units within a comparatively small geographical area, this problem has received some attention both by men and management.

Before 1959, there were a few dis-

cussion groups which were organised by the men. When the motormen formed part of the Electrical Engineer's Department members of the technical staff gave occasional lectures, and a certain amount of equipment and charts was provided.

#### Large-scale training necessary

With the introduction of the Stage I Electrification extension to the Kent Coast, it became necessary during 1958 and 1959 to arrange for large-scale training of existing steam locomotive drivers to drive the new forms of motive power, including large numbers of motormen for the new electric multiple units.

Care has been taken that the training is both thorough and complete. To ensure that the staff gets the opportunity to increase its knowledge and retain interest in its work it has been necessary to give further help to the discussion groups.

It was decided that, within the electrified areas, motormen who were known to be interested in vocational training would be encouraged to form discussion groups. These were to be loosely grouped within three areas, i.e., South Eastern, Central, and South Western.

It was emphasised that the organisation and control of these groups must be borne entirely by the staff on the lines of the steam mutual improvement classes, but that management would encourage their growth by providing suitable premises, lecturers, equipment, projectors, films and film strips, and would arrange visits to such places as signal-boxes, and inspection sheds.

A central library of film strips and films for loaning to discussion groups was formed and covers the following:—

#### Films

Generation of electricity; Transmission of electricity; a.c. and d.c.; Diesel on rail; Blue edge; A future on rail.

#### Film Strips

Buck-eye couplings on E.P.B. units; Vacuum brake; single-line working; Preparation and disposal of Kent Coast express stock, 5001 E.P.B. suburban stock, Express stock, English Electric stock, Metropolitan-Vickers stock.

To publicise the activities of the discussion groups it was also decided to introduce a competition between teams of motormen from each of the three areas.

Prizes and a shield were obtained to be presented to the winning team, as well as a miniature plaque to be permanently exhibited at the depot concerned.

The contest is organised on the lines of the British Railways Mutual Improvement Class Competition.

As knowledge of the motormen's competition spread, the number of discussion groups rose and, at present, there are ten active discussion groups with others in process of formation.

It also became apparent that there was a need for a more specialised type of lecture to be given at a central point in reach of any depot.

#### Well publicised

These lectures are well publicised and attended not only by large numbers of motormen from the discussion groups but also members of other departments. They are held in London at approximately two-monthly intervals through the winter season and up to now have included the following:—

"Design and handling of Kent Coast trains," by the Chief Mechanical & Electrical Engineer, Southern Region.

"How would you train a motorman?" by the Motive Power Officer, Southern Region.

"Electrical multiple unit equip-

*Continued on page 253*



Motormen of the South Eastern Division—the winning team in the 1960 contest held by the motormen's discussion group

## THE USE OF REFRACTORY CONCRETES for locomotive arches

An examination of the advantages in terms of life, economy, and ease of maintenance offered by this material compared with brick

REFRACTORY concretes, or castable refractories as they are sometimes called, have been available for many years and their use in obtaining the advantages of monolithic construction is well known. The term "refractory concrete" perhaps is usually associated with a mixture of aluminous cement (Ciment Fondu or Lightning in this country), and a crushed firebrick aggregate with a service temperature limit of about 1,300-1,350 deg. C. The introduction of Secar 250, a white pure calcium aluminate cement having less than 1 per cent impurities (silica and iron oxides), which is much more refractory than Ciment Fondu, has greatly increased the range of refractory concretes.

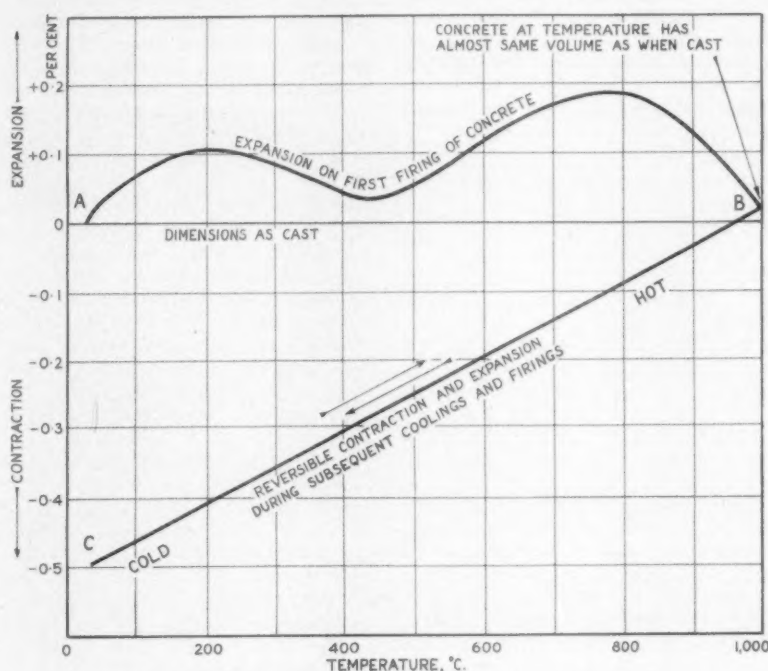
The service temperature limit of Secar 250 refractory concrete depends on the type of aggregate used, and varies from about 1,450 deg. C. to 1,500 deg. C. for a Secar 250/crushed firebrick mix to about 1,800 deg. C. for a Secar 250/fused alumina mix. A detailed description of the properties and methods of use and installation of refractory concretes already has been published in several articles (1) and therefore will only be summarised here.

Both cements are extremely rapid hardening and refractory concretes made from them are ready for use in most applications in 24 hr. Refractory concretes are also extremely resistant to thermal shock, as they are capable of resisting extreme fluctuations of temperature. They have similar expansion characteristics up to 1,300 deg. C. as shown in the graph on this page.

### Expansion joints unnecessary

This graph shows that, for all practical purposes, the dimensions at operating temperature are the same as the cold unfired dimensions. Expansion joints therefore are unnecessary, butt joints being sufficient. With Secar 250 refractory concretes operating above this temperature, thin expansion joints may be advisable. The slag resistance of refractory concretes primarily will depend to a large extent on the type of aggregate used; for example, a Secar 250/fused alumina concrete has an excellent resistance to both basic and acid slags and to fused ash.

The same precautions for mixing and placing recommended for Ciment Fondu refractory concretes also are to be observed with Secar 250 refractory



Volume changes in refractory concrete when put in service

concretes. For example, clean, cold water fit for drinking always should be used for gauging; tools and mixers should be clean and free from Portland cement, lime, or plaster, and porous aggregates preferably should be pre-soaked. This usually is done by placing the aggregate in a mixer, adding water and mixing for 5 min. Any residual water should be drained off and the cement added to the soaked aggregate. More water can be added to bring the mix to required consistency, which should not be too sloppy. Where possible, compaction of the concrete by vibration, either by immersion poker vibrator or by external vibrators attached to the shuttering, will result in the production of a better-quality concrete.

### Early application

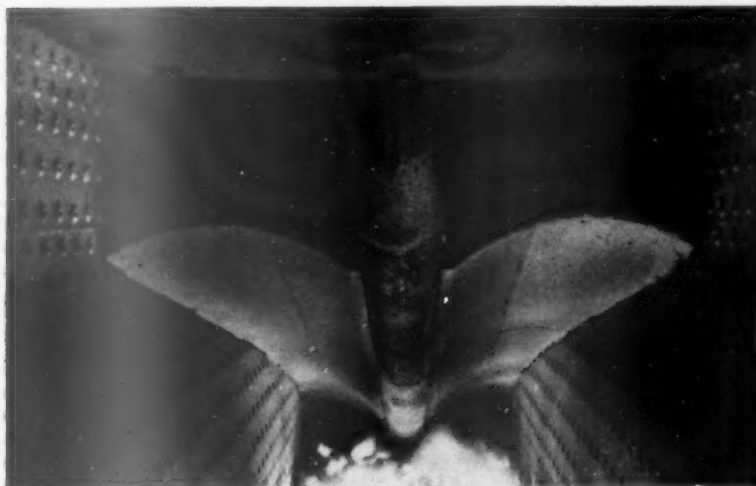
In locomotive firebox arches, the inherent weaknesses of refractory brickwork are accentuated by mechanical shock and vibration, and the monolithic construction of the arch offers very distinct advantages. Although there is some evidence that Ciment Fondu refractory concretes were used satisfactorily in locomotive fireboxes by the

Irish railways as early as 1934, apparently it was not until the end of the last war that trials with arches made from this material were carried out in this country. In France, trials were begun in 1946, because about that time the Armand integral treatment for boiler-feed water prolonged the period between engine shutdowns, but it was found that locomotives still had to be taken out of service for arch repairs and renewals between "washouts."

### S.N.C.F. research

To obtain full advantage from the extended period between "washouts" the life of the firebox arch had to be improved. Towards this end, the Northern Region of the S.N.C.F. investigated different materials and new assembly techniques. Monolithic construction was preferred for obvious reasons and several arches were installed in one class of locomotive. These were constructed in refractory concrete consisting of Ciment Fondu/crushed bricks (30 to 32 per cent alumina content), and results were so encouraging that further trials were carried out with a more refractory mix of Ciment Fondu/





*Arch in Ciment/Fondu chamotte after 10,000 miles*

chamotte\* (40 to 44 per cent alumina content) in the proportions of 400 kg. per cu. metre of aggregate (approximately 25 lb. per cu. ft.).

The results obtained on the Belpaire firebox, even where difficulties were presented by a siphon tube (see illustration above) were satisfactory, and the use of Ciment Fondu refractory concrete arches therefore could be extended to all locomotives in the Northern Region and to a large number in other regions, with the reservation that temperatures on the underside of the arch should not exceed 1,300 deg. C. The life of these arches varied from one to two years, representing a mileage of approximately 62,000 to 74,000.

Because of the short supply of refractory bricks and the delay in obtaining special shapes immediately after the end of the last war, trials with Ciment Fondu refractory concrete arches were put in hand in the London Midland Region at Derby in 1946, and in the Scottish Region at St. Rollox in 1947.

#### Use in Scotland

In 1948, both these depots reported that the arches had proved successful. At St. Rollox, they were installed in Class "3F" tank locomotives used for shunting; Class "2P" tank locomotives used for local passenger trains, and Classes "2F" and "3F" tenders used for goods traffic. They were stated to be greatly superior to the normal brick arch and had a life of about a year. Refractory concrete arches subsequently were installed at Aberdeen.

In the Western Region, trials carried out at Swindon proved so successful on the "5700" type of freight tank locomotives that the installation of Ciment

\*Chamotte is a specially prepared refractory aggregate. It is made from good-quality fireclays and usually is fired in the lump form, which is subsequently crushed and graded. It has an alumina content of 40 to 44 per cent. This material, therefore, is equivalent to a crushed high-quality firebrick.

Fondu refractory concrete arches on this type became standard. In all, some 900 locomotives were so fitted. The life of the arch varied between 18 months to 2½ years, representing a possible mileage of approximately 40,000 to 70,000.

#### Other installations

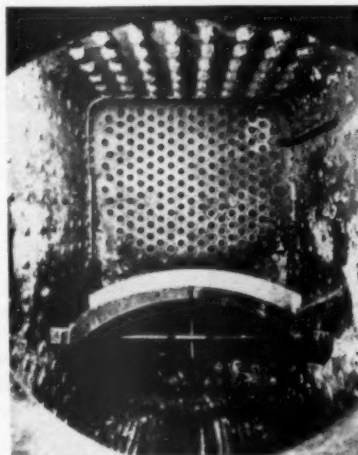
Following the success of the arches at Derby, many other depots in the London Midland Region began installing them. At Newton Heath and at Longsite they were installed in the following types of locomotives:—

"8F"	2-8-0 (ex L.M.S.)
"8F"	2-8-0 (ex W.D.)
"5MT"	2-6-0 (P. Boiler)
"4F"	0-6-0
"3F"	0-6-0
"3F"	0-6-0 (tank)
"2P"	4-4-0
"4MT"	2-6-4 (tank)

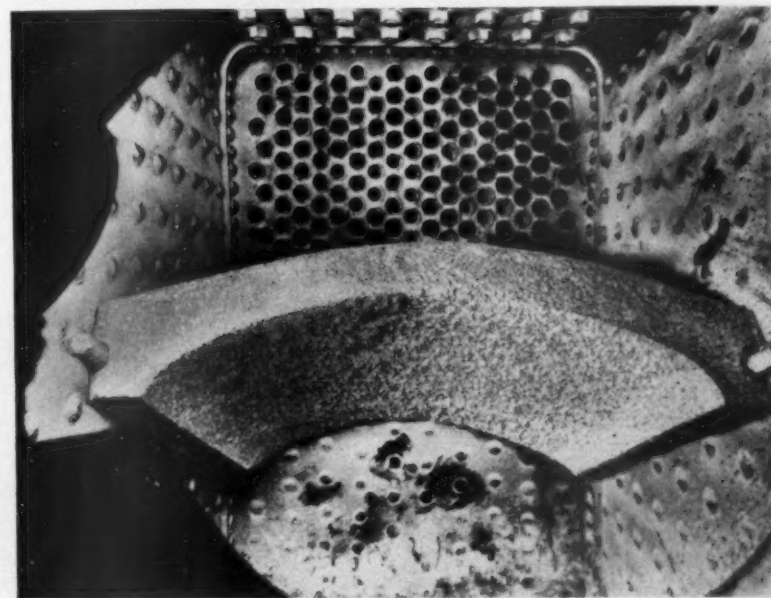
and were stated to be giving a longer life than firebrick.

The arches are of monolithic construction, which seems to be the method preferred both in this country and abroad, although trials with precast refractory concrete shapes in a firebox of a Class "B1" passenger locomotive reported these in excellent condition after three months' service compared with the life of six to eight of a normal refractory brick arch in this type of locomotive.

The original arches were cast on wooden shuttering but, following their successful use, removable adjustable steel shuttering was designed at Derby. This shuttering can be adapted for more than one type of locomotive and usually is

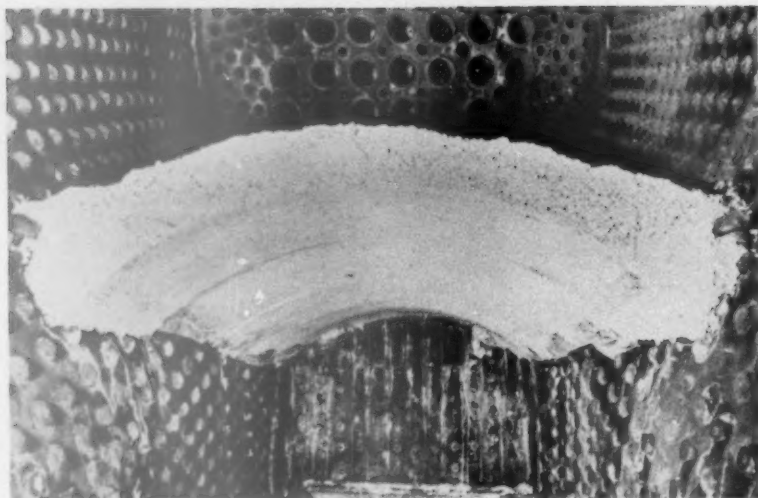


*(Left): shuttering in position in locomotive firebox for refractory concrete arch*



*Typical example of Ciment Fondu refractory concrete arch in Ciment Fondu/crushed firebrick mix*





Refractory concrete arch in "Royal Scot" Class locomotive using Secar 250/fused alumina mix

clamped in position to the side of the firebox by adjustable screw clamps as shown on the previous page.

The refractory concrete normally comprises one part Ciment Fondu to four parts crushed firebrick graded from  $\frac{3}{8}$  in. down to dust, but it appears that both mix proportions and grading vary between depots. For instance, the original mix reported to be used at St. Rollox was 2 $\frac{1}{2}$  parts crushed firebrick  $\frac{3}{8}$  in. to  $\frac{1}{2}$  in. to two parts crushed firebrick  $\frac{1}{4}$  in. down to dust to one part Ciment Fondu. The mix reported to be used at Swindon was two parts crushed firebrick  $\frac{3}{8}$  in. to  $\frac{1}{2}$  in. to two parts crushed firebrick  $\frac{1}{4}$  in. to  $\frac{1}{8}$  in. to one part crushed firebrick  $\frac{1}{16}$  in. down to dust to one part Ciment Fondu. Compaction of the concrete is by hand-tamping, and curing is carried out by covering the arch with wet sacks for approximately 24 hr., after which the arch is ready for use. A typical example of a Ciment Fondu refractory concrete arch is shown on page 249.

#### Effective range of application

By 1954, the success of these arches in all classes of locomotives up to and including Class "4" and their superiority over the normal refractory brick arch was established. Although trials on a Class "8" locomotive in this refractory concrete, using a mix of one part Ciment Fondu to three parts crushed firebrick  $\frac{3}{8}$  in. down to dust, gave a very promising life of six months compared with the three-month life of the normal brick arch, trials in the larger express passenger and heavy freight locomotives with Ciment Fondu refractory concrete arches indicated that they were a little better than brick. It therefore was considered that, on types such as Classes "8P," "7P," and "9F," a Ciment Fondu refractory concrete arch would give practically no better service than a

normal brick arch and its use would not be justifiable.

This may have been because of the greater span of the arch and the tremendous vibration set up at very high speeds, but excessive temperatures and draught attained at very high firing rates and severe corrosion attack by the high-velocity molten-ash particles indicate that a more refractory mix was necessary. Consequently, with the introduction of Secar 250 with its higher refractoriness and improved slag resistance, it was felt that these opinions might be revised and that trials in a Secar 250 concrete would be advisable.

#### Troublesome classes

The classes of locomotives on which the arches probably are most troublesome are "7P" Royal Scot Class and the heavier freight class such as Class "9F." Trials on a Class "9F" locomotive had shown that, although the life of a Ciment Fondu refractory concrete arch was comparatively short, it was practically double that of a normal firebrick arch and that further trials in this class of locomotive with a Secar 250 refractory concrete arch therefore would be justifi-

able. If successful trials in "7P" and "8P" class locomotives would be considered.

A Secar 250/crushed firebrick mix was selected and an arch cast *in situ* in a Class "9F" locomotive (No. 92124), which has a large firebox and a wide arch span, the dimensions of the arch being 4 ft. 9 in. span  $\times$  4 ft. 6 $\frac{1}{2}$  in. long. Arch thickness was from five to six inches, and the actual mix used was one part Secar 250 to four parts crushed firebrick  $\frac{3}{8}$  in. to dust.

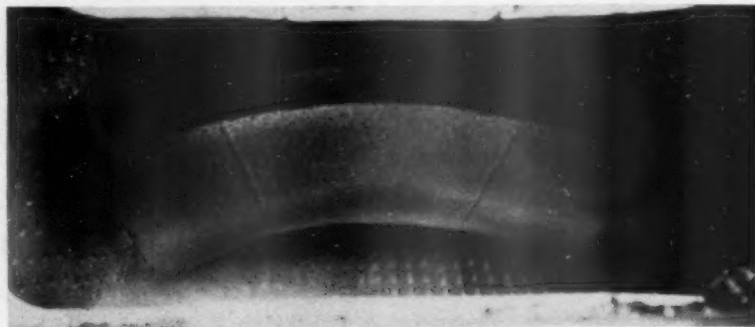
#### Steel shuttering

The arch was installed on removable steel shuttering and the concrete compacted by hand-tamping. The time taken to place and compact the concrete was about 1 $\frac{1}{2}$  hr.; the shuttering was removed after 5 hr., and the arch cured for 24 hr. by covering with wet sacks. The locomotive was put in service after comparatively slow warming-up. Inspection after five weeks showed that, although some localised wear had occurred at the centre, the general condition of the arch was extremely good. The arch eventually failed after 17 weeks, the final collapse being accelerated by steam scour resulting from a leaking boiler tube.

The life of this arch was considered extremely satisfactory and it was decided to install trial arches on a "Royal Scot" Class locomotive. The mix selected for the first trial was a Secar 250/fused alumina mix.

The locomotive selected for the trials was the *Rifle Brigade*, No. 46146, and the mix used was one part Secar 250 to four parts fused alumina  $\frac{3}{8}$  in. to dust. Curing was carried out as on the Class "9F" locomotive, and the arch was given a preliminary warming-up with a wood fire followed by a gradual increase in temperature from a coal fire. The arch failed after about 3 $\frac{1}{2}$  weeks.

The improvement over the brick arch nevertheless merited further trials. For the second trial, a less refractory and more economical mix of Secar 250/calcined bauxite was selected and an arch cast *in situ* on another "7P" Class locomotive the *Illustrious*, No. 45532.



Arch in Secar 250/chamotte after 5,000 miles

Because of the shortage of fine calcined bauxite, the mix was altered to comprise one part Secar 250 to four parts of a mixture of equal quantities of calcined bauxite  $\frac{3}{8}$  in. to  $\frac{1}{2}$  in. and fused alumina fines  $\frac{1}{8}$  in. to dust. After the normal curing and slow warming-up of the arch it was put in service. An inspection after two months showed that the arch was in an extremely good condition, and that remarkably little wear had occurred. The locomotive was eventually taken out of service for a scheduled workshop repair after approximately six months, when the Secar 250 arch was still in service although almost at the point of failure.

This arch has given a record life of six months and a mileage of approximately 32,000.

In view of the success of this arch, further trials of Secar 250 refractory concretes are to be undertaken. In this connection, the use of brown fused alumina in Secar 250 mixes might prove worth investigating. It is more economical than the white, being roughly three-quarters of the cost, and is supplied in standard sizes to ensure consistent grading. It also has a slightly lower service temperature limit than the white and should give a stronger refractory concrete at arch temperatures. A typical example of a Secar 250 refractory concrete arch in a "Royal Scot" Class locomotive is illustrated.

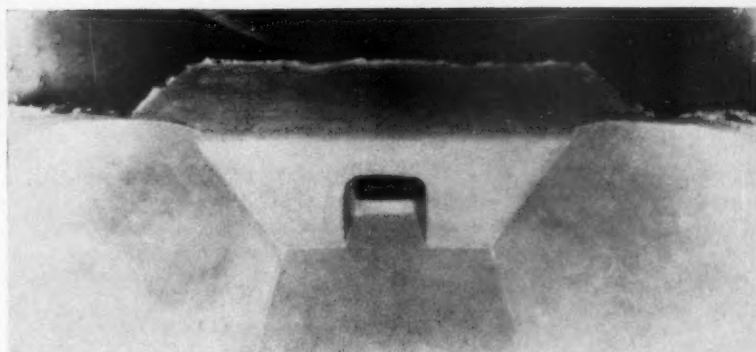
The latest results of extended trials in Class "9F" locomotives using a concrete of higher refractoriness than the normal Ciment Fondu/crushed firebrick confirm the successful results obtained in the preliminary trials on this class of locomotive. These extended trials were carried out by the L.M.S. and Western sections.

Several refractory concrete arches were cast by each section and, in the Western, a mix of Secar 250/crushed firebrick was used. This gave a very satisfactory life of from 14 weeks initially to a maximum of 26 weeks.

#### London Midland experience

The L.M.S. section used a proprietary castable premix consisting basically of Ciment Fondu and a refractory aggregate having a higher refractoriness than the normal crushed firebrick to increase the refractoriness of the concrete. The arch life obtained from this mix was about 16 weeks which, although very satisfactory compared with the brick arch, was much shorter than the best life of 26 weeks obtained with the Secar 250/crushed firebrick mix. It therefore seems probable that, following the success of these extended trials, the use of refractory concrete soon may be officially adopted by both these sections for Class "9F" arches.

In France, an attempt has been made to improve the arches of "231 G-K"



Monolithic refractory concrete walls in oil-fired firebox of French Type "141 R" locomotive

Class locomotives by modifying the inclination of the arch and the distance of the underside of the arch from the firebox. Although some improvement was obtained, arch renewals were still necessary when the locomotives came in for intermediate overhaul.

It therefore was obvious that further improvement would be obtained only by the use of a more refractory mix, i.e., the

mix of Secar 250/brown fused alumina to determine whether the increased refractoriness of this mix will eliminate the necessity for its replacement at interim overhauls.

This type of arch has not been in service sufficiently long for any assessment to be made. A comparison of the lives of a refractory brick arch and a Ciment Fondu or Secar 250 refractory

#### COMPARISON OF THE LIVES OF A NORMAL BRICK ARCH WITH THOSE OF REFRACTORY CONCRETE ARCHES

Locomotive type	Brick Arch (miles)	Ciment Fondu refractory concrete arch	Secar 250 refractory concrete arch
"231E" ...	15,000	74,000*	—
"230D—242TA" ...	15,000	48,000*	—
"141TC" ...	6,000	62,000*	—
"150P" ...	6,000	68,000*	—
"231G-K" ...	9,000	31-37,000	49,000-55,000
"141" with siphon ...	12,000	55,000	74,000
"141P" without ...	9,000	12-18,000	37,000
"241P" central ...	12,000	28,000	62,000
"241P" lateral ...	9,000	74,000	99,000
"141R" central ...	12,000	31-37,000	56,000
"141R" lateral ...	9,000	74,000	99,000 to 110,000 expected

\*The distance run by these locomotives between any two repairs necessitating stripping the arches, even though these are capable of longer service

substitution of Secar 250 for Ciment Fondu. Arches of this mix were installed on the "231 G-K" Class locomotive, and a life of 12-18 months, representing from 40,000 to 50,000 miles, now is being obtained.

Certain locomotives, such as the "141P," have two types of arch depending on whether they are with or without siphon. The arch for the locomotive without siphon is constructed from Secar 250/chamotte (see illustration on this page), while the arches installed on a siphon locomotive, comprising two narrow sections, are constructed from Ciment Fondu/chamotte (see top illustration on page 249).

Locomotives of the type "141R" have two siphons and are fitted with arches made from Secar 250/chamotte. These have a life of from 87,000 to 105,000 miles before "lifting"—a periodic operation during which the arch is stripped down. The centre section of the arch lasts for approximately half this running time and needs replacing during interim overhaul. Trials are therefore being carried out with this section in a

concrete arch is given above.

Some types of "141R" locomotives are oil-fired and have a combustion chamber with low walls made from refractory bricks. The depot at Le Teil, France, has looked into the question of making up suitably shaped parpens and other sections of concrete using Ciment Fondu/chamotte, while other concerns have shown a preference for jointing up refractory linings using a refractory mortar made from Ciment Fondu and fine chamotte; in both cases, the life of the walls has been improved. Other undertakings are finding it an advantage to replace the firebrick walls by monolithic refractory concrete walls.

The information on the use of refractory concrete arches in France has been taken from a recent paper<sup>(2)</sup> giving an extract of the results of research work carried out by the French railways.

#### REFERENCES

- (1) "Refractory concrete made with Ciment Fondu;" "Super-duty refractory concretes made with Secar 250;" issued by the Lafarge Aluminous Cement Co. Ltd., 73, Brook Street, W.1.
- (2) *Les Voies Monolithes en Beton Refractaire de la S.N.C.F.*, L'usine Nouvelle, October, 1959, pages 29-33.

## SLIP AT WIVELISCOMBE on Paddington-Penzance route

**Extensive slip following unprecedented wet weather affects train services in both directions**



*The slip on the day of its occurrence*

A MAJOR slip occurred in the Up side cutting at the Plymouth end of Wiveliscombe Tunnel just before 6.20 a.m. on January 30. The 5.10 a.m. ex-St. Austell passenger train, which passed the site at 6.20 a.m., ran into rock which had fallen across the Up line and the diesel engine and four coaches were derailed. Both lines were blocked, the last coach of the train remaining on the rails just inside the tunnel.

Train services in both directions were affected, and immediate steps were taken to introduce an emergency bus service between Saltash and St. Germans, with shuttle train services between Penzance and St. Germans and between Plymouth and Saltash. Main-line trains to London and other points commenced their journeys at Plymouth.

### Extent of slip

The cutting at the site is some 60 to 70 ft. deep and the slip extended approximately 34 yd. from the tunnel entrance and 30 yd. back into fields from the original toe of the slope.

The initial slip was caused by the very heavy rainfall on Sunday, January 29, following the unprecedented wet weather of the last few months. The first fall brought down a considerable amount of shale and top soil which spilt over both tracks, and left a large overhang of

several thousand tons of rock which it was essential to trim back before even single-line working could be considered.

The Down road was cleared and re-laid on the day of the mishap to enable the breakdown crane to work, and a 19 R.B. face shovel and a Traxcavator ordered to the site.

On Wednesday, February 1, it was

decided to attempt to undercut the overhanging shale by drilling at the base of the slip five 20-ft. deep holes at about 3 ft. above rail level. On the afternoon of February 2, five charges (70 lb.) of gelatine dynamite were exploded. This was not successful because of the fissured nature of the shale, and only about 100 tons of the overhanging shale was brought down. This was moved by the Traxcavator.

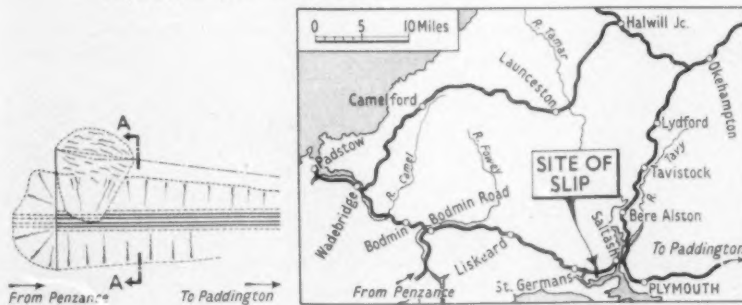
### Blasting

Clearance of the top soil from the top of the slip was carried out preparatory to drilling. In an attempt to blast the overhanging shale from the top, five charges (100 lb.) of opencast gelignite were exploded on the Saturday morning and again this was not successful, the bulk of the overhanging shale remaining. Nevertheless, it had been possible to open the Down road for single-line working for freight traffic from 11 p.m., on the Saturday evening until 7.30 a.m., on the Sunday morning, and for each succeeding night.

Meanwhile, the face shovel had been taken up the cutting to 20 ft. above rail level in an effort to dig out the slip material. The top soil was placed on adjacent land and the shale pushed down the cutting for the Traxcavator to clear. By Sunday, February 5, the face shovel had dug well into the shale, but had reached a depth which would not allow it to tip any more material away from the cutting. The Traxcavator was then switched to the top of the slip to remove the remainder of the top soil, preparatory to further blasting. The soil was pushed



ENLARGED SECTION A.A.



*Diagrammatic representation of the Wiveliscombe slip*



back on adjacent land. The face shovel was used at the base of the slip to load debris.

On Wednesday, February 8, further blasting was carried out at the top of the slip, using 12 10-ft. deep bores with 17 lb. of opencast gelignite per hole. This was completely successful: some 600 tons of shale were brought down and the overhanging rock was completely shattered.

A facing crossover was laid at the St. Germans end of the tunnel on February 9,

and single-line working introduced over the Down line between that point and Wearde signalbox at 3 a.m., on February 10.

At 11 a.m. on the Friday morning, a further movement of the slip was noticed near the tunnel face and traffic was stopped, while the face shovel removed the shale which had fallen. Single-line working was reintroduced at 3 a.m., on the Sunday morning and will continue until the debris has been completely cleared from the base of the slip, the

Engineering Department taking possession for six hours each night to load up the debris. To date, between 30 and 40 wagonloads of spoil have been loaded up on each day since the slip occurred.

It is expected that it will take at least two weeks to trim the face of the slip back to a safe angle of repose.

All site work was carried out under the direction of Mr. N. S. Cox, District Engineer, Plymouth, and the Amalgamated Roadstone Corporation Limited co-operated in blasting operations.

## Reconstruction of 247-ft. span under traffic

**Forty-ft. deep trusses at Snake River, U.P.R.R., moved in and erected under traffic 110 ft. above the river**

AT AMERICAN FALLS, Idaho, the single-track Northwest main line of the Union Pacific Railroad crosses the Snake River on a viaduct 962 ft. long, rail level being 110 ft. above the river bed. The superstructure has hitherto consisted of one 247-ft. deck truss span and a number of plate-girder deck spans. Built in 1902, the truss span had deteriorated and was not up to modern traffic standards; having a transverse-sleeper open deck, it was also vulnerable to fire. It had therefore to be replaced by a new superstructure capable of carrying all foreseeable motive-power and other loadings on this trunk route to the Pacific Northwest, and impervious to fire danger.

The considerations facing the administration were that diversion of this important traffic by detours over "foreign" lines would be prohibitively costly. A local diversion to cross the valley and river, over 100 ft. below, and construction of conventional falsework for the erection of the new span was also considered too expensive.

### Erection with little traffic delay

Accordingly, it was decided to build the new span round the old one. The work was completed as described below within six months and with a period of interruption to traffic of only a few hours.

As assembled and erected, the new main girders each have N-type panels and beyond the end ones are raking members—resembling the portal members of a through truss—the bearings being fixed below their junctions with the lower chords. This has the advantage over the underslung type of deck truss in requiring piers shorter by the depth of the truss, 40 ft. in this instance.

The riveted truss members were fabricated in Omaha and railed to American Falls, where they were assembled on a special track, laid on the

approach embankment and consisting of four parallel rails about 500 ft. long. The two inner rails were of 4 ft. 8½ in. gauge and 131-lb. material connected with the main line near the bridge. The outer rails were spaced 16 ft. apart, the spacing of the main girders of the old span, along the top chords of which they were continued.

### Erecting the girders

Each new girder, weighing 250 tons, was erected on two specially-strong bogies, each with a transverse steel outrigger extending over the 16-ft.-gauge outer rails and bearing on them by means of shoes. A heavy diagonal strutting brace was also fixed to each end of the outrigger over the shoe and extending to the top of the truss, to maintain the lateral stability of the truss; the latter was also braced in the horizontal plane and guyed longitudinally to preserve rigidity when it was moved into position. On the completion of the erection of each truss on the track laid on the approach embankment, it was hauled slowly into a central position on the old span by a winch mounted on a locomotive crane.

Meanwhile, two 150-ft. truncated A-frame gantries had been erected on concrete foundations near the ends of and straddling the old span; they were guyed to one another and to concrete anchorages beyond the ends of the span. Each frame consisted of lattice steel legs inclined inwards in the transverse plane to a cross head-frame connecting them near their tops. Each head-frame was provided with two sets of block and lifting tackle near its ends, and the truss was lifted off the bogies using both blocks from which it swung, allowing the bogies and outriggers to be removed clear. The load on one block was then slackened off, the whole weight being taken by the other, swinging the new truss outwards

beyond the old span ready for lowering. After lowering on to the old piers the new truss was secured to the old span preparatory to the fixing of the cross members.

The panel-points were staggered so that those of the new trusses were midway between those of the old. The new top and bottom chords are also slightly higher than the old, these design features enabling the bracings and cross girders to be threaded in between the members of the old span. The new deck will be of the ballasted type, and the plate-girder approach spans are also being provided with this instead of the hitherto open types. The estimated cost of the whole work, including these alterations to the approach spans, is about £180,000, and the work is being carried out under the direction of Mr. J. Curran, Bridge Engineer, U.P.R.R., and the general direction of Mr. A. J. Bunjer, Chief Engineer.

### Voluntary vocational training for motive power staff

*Concluded from page 247*

ment," by the New Works Engineer (Rolling Stock) Southern Region.

"Modern multiple-aspect signalling," by the Chief Signal & Telecommunications Engineer, Southern Region.

"The Westinghouse & E.P. brake," by The Westinghouse Brake & Signal Co. Ltd.

The response has been so good that some lectures have been repeated to satisfy the demand.

Similar facilities will be provided for the drivers of diesel and electric locomotives as well as of diesel multiple units. Indeed, at certain depots which have changed over completely from steam to diesel traction, the mutual improvement classes have remained in being.

It is to be hoped this unique voluntary training will not die as the forms of traction change.

The work done by the Southern Region in this field so far has stimulated the interest of drivers and motormen in voluntary vocational activities connected with their work.

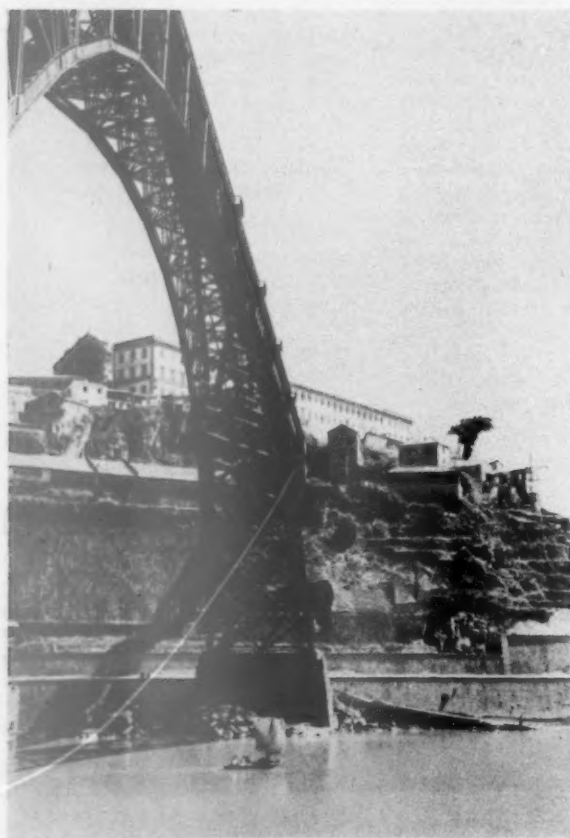




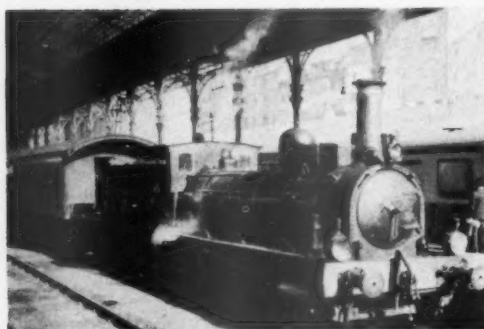
*Maria Pia single-track railway bridge over the Douro at Oporto*

## Maria Pia Bridge, Portuguese Railways

Proposed replacement of bridge with double-track structure (see editorial on page 238)



*Arch of bridge from below*



*Beyer Peacock 0-6-0 locomotive at Oporto*



*Name plate on 0-6-0 locomotive No. 25*

# PERSONAL

## British Railways

MR. L. W. IBBOTSON, Assistant General Manager (Modernisation), British Railways, Western Region, who has been appointed Assistant General Manager (Traffic), was educated at Radley College and entered the service of the London & North Eastern Railway as a Traffic Apprentice in 1927. After six years' training in the Southern, Scottish and North Eastern Areas, he was appointed as Assistant Yard Master at West Hartlepool. He then occupied various positions in the District Operating Office at Darlington, and was transferred as Chief Clerk to the Newcastle District Superintendent in 1939. During the war he was employed on various special duties in Headquarters Offices at York and was then appointed as Assistant District Superintendent, York, later becoming Trains Assistant.



Mr. L. W. Ibbotson

ant to the Superintendent and Locomotive Running Superintendent. In 1945, after a short period as Acting District Superintendent, York, he became District Superintendent, Darlington. He was awarded the M.B.E. in 1948. In 1950 Mr. Ibbotson was promoted to the Western Region as Assistant to the Operating Superintendent at Paddington. He became Assistant General Manager (Modernisation) in 1959.

MR. C. T. ROBERTS, B.Sc.(ENG.), M.I.MECH.E., M.I.LOCO.E., Principal Assistant, Chief Mechanical & Electrical Engineer's Department, British Railways, Western Region, who has been appointed Chief Mechanical & Electrical Engineer, Scottish Region, commenced his railway career at Swindon, in 1923, as a Premium Apprentice in the Locomotive Works. He was transferred to the Drawing Office in 1928, and in 1937 became Assistant to the Carriage & Wagon Works Mana-



Mr. C. T. Roberts

ger. He was called up with the Territorial Army in 1939 and released two years later, at the request of the Great Western Railways, to return to the Carriage & Wagon Works. Mr. Roberts became Carriage & Wagon Works Manager in 1947, Locomotive Works Manager in 1948, Carriage & Wagon Engineer, Western Region, in 1957, and Principal Assistant to the Chief Mechanical & Electrical Engineer when the Carriage & Wagon Department was merged with the Chief Mechanical & Electrical Engineer's Department in 1957.

British Railways, Eastern Region, has announced that the Economic Survey Office has been redesignated Traffic Survey & Costing Office and that the following appointments have taken effect: MR. P. W. GLASSBOROW as Traffic Survey & Costing Officer; MR. H. BURTON as Traffic Costing Officer; MR. J. A. B. HIBBS as Traffic Survey Officer, all located at Liverpool Street.

British Railways, London Midland Region, has announced the following appointments: MR. H. CRAIG to be Goods Agent, Bankfield & Canada Dock; MR. T. U. HILL to be Stationmaster, Stoke-on-Trent; MR. S. J. KESSELER to be Goods Agent, Aston, Birmingham; MR. J. W. CRAIG to be Stationmaster, Liverpool, Lime Street.

MR. P. J. F. BENDER, Assistant to District Engineer, Kings Cross, Eastern Region, British Railways, has been elected as an Associate Member of the Institution of Civil Engineers.

We regret to record the death, on January 23, of MR. W. CROZIER, O.B.E., who was, until his retirement in 1936, Operating Manager in Scotland of the London Midland & Scottish Railway.

MR. T. W. RATCLIFFE, Assistant to Accountant, Darlington, British Railways, North Eastern Region, has retired.

We regret to record the death, on February 22, of MR. R. J. ARMSTRONG, who was, until his retirement in 1946, Divisional Locomotive Superintendent, Worcester, Great Western Railway. Mr. Armstrong joined the Great Western Railway in 1896, and was appointed Assistant Locomotive Superintendent, Swindon, in 1910, moving to a similar post in Bristol in 1912. He became Divisional Locomotive Superintendent, Bristol, in 1919, and Divisional Locomotive Superintendent, Worcester, in 1929. His retirement ended a long family connection with the G.W.R. Mr. Armstrong's father, Mr. Joseph Armstrong, who came from the same village as George Stephenson and Timothy Hackworth, and attended the same school as Robert



The late Mr. R. J. Armstrong

Stephenson, was, until his death in 1877, Locomotive Superintendent of the G.W.R. Mr. Armstrong's great uncle, Mr. George Armstrong, was Locomotive Superintendent, Northern Division, G.W.R., and his father, Mr. John Armstrong, M.V.O., was Divisional Locomotive Superintendent, Paddington.

## Overseas

MR. G. F. BROWN, Commissioner, Victorian Government Railways, who becomes Deputy Chairman of Commissioners, began his career as an apprentice fitter and turner, at Newport Railway Workshops in 1923. He became an engineering assistant in 1929 and, in 1934, was lent to the Country Roads Board, to advise on the design of road-building equipment. He designed a bitumen heater and sprayer now used throughout Australia. Mr. Brown was appointed Plant



Mr. G. F. Brown

Engineer, in 1937, and, in 1943, he became Superintendent of Locomotive Maintenance. He visited the U.S.A., in 1950, in connection with the design and maintenance of the diesel-electric locomotives for the Department. He acted as Chief Mechanical Engineer during the absence abroad of Mr. A. C. Ahlston and, on the latter's retirement, succeeded him as Branch Head. Mr. Brown was appointed Commissioner in 1958.

MR. NORMAN QUAIL, Deputy Chairman of Commissioners, Victorian Government Railways, who has retired, began his railway career in 1910, as a junior clerk in the Transportation Branch. He later transferred to the Electrical Engineering Branch. During the 1914-18 war, he was commissioned in the First Australian Imperial Force. While serving in France, he was awarded the Military Cross. Shortly after demobilisation, he became Personal Clerk to the Chief Electrical Engineer, and later Staff Clerk of the Branch. He was subsequently transferred to the Secretary's Branch, as Senior



Mr. N. Quail

Clerk to the Staff Board. After holding a number of senior staff positions, he became Chairman of the Staff Board in 1947. Mr. Quail was appointed Secretary for Railways in 1949, Commissioner in 1956, and Deputy Chairman of Commissioners, in 1958.

MR. S. DAVIS, Chief Superintendent, Nigerian Railway Corporation, has retired from that position and taken up the post of General Manager, Maki Smelting Co. Ltd., Northern Nigeria. He has been succeeded as Chief Superintendent of the Nigerian Railway by Mr. F. H. Jackel, Deputy Chief Superintendent (Traffic).

MR. H. M. ALEXANDER, M.I.C.E., Deputy Chief Engineer (New Works), Nigerian Railway Corporation, who as recorded in our February 24 issue, was recently appointed Chief Engineer, Nigerian Railway Corporation, began his engineering career, in 1936 as a pupil engineer articled to Messrs. John Cowan and Linn, Consulting Engineers, Glasgow. In 1941 he took up appointment as Assistant Engineer with Messrs. Melville, Dundas and Whitsun Ltd. (Contractors), but left a year later to serve in the Royal Navy from 1942-1946. He joined



Mr. H. M. Alexander

the Nigerian Railway in August, 1946, as an Assistant Engineer and acted as engineer-in-charge of several sub-districts. In 1950 he was promoted Senior Assistant Engineer and, in December, 1954, District Engineer in charge of the Northern District with headquarters at Zaria. Mr. Alexander officiated as Assistant General Manager (Works) in early 1957 and, in April, 1957, he was promoted Deputy Chief Engineer (New Works), and seconded for duty on planning the Bornu Railway Extension. From August, 1958, until his appointment in November, 1960, he was engaged on the actual construction of the Bornu extension.

MR. F. A. O. PHILLIPS, M.B.E., M.I.MECH.E., A.M.I.L.O.C.E., Assistant General Manager (New Works), Nigerian Railway Corporation, who, as recorded in our February 24 issue, was appointed Chief Mechanical Engineer in October, 1960. He entered railway service in 1935 as a Special Course



Mr. F. A. O. Phillips

Apprentice, and progressively became Artisan Grade II, Draughtsman Grade I, and Mechanical Assistant Grade II, before proceeding to the United Kingdom on an engineering scholarship in 1943. On his return from Britain in September, 1947, he was appointed Assistant Works Manager. He was promoted Senior Assistant Works Manager in 1950, and Works Manager in August, 1954. When the Railway Corporation was established on October 1, 1955, the post of Works Manager was redesignated and upgraded as Locomotive Works Superintendent. Mr. Phillips has acted as Deputy Chief Mechanical Engineer on several occasions and, from August, 1959, to March, 1960, he officiated as Assistant General Manager (Works).

MR. F. V. STONE, Assistant to the President, Canadian Pacific Railways, has been appointed Vice-President, Natural Resources.

## Industrial

MR. G. D. TOOGOOD has been appointed Sales Manager of the Superheater Co. Ltd.

MR. E. W. YOUNG has been re-appointed Chairman of Massey-Ferguson (United Kingdom) Limited, the position he relinquished in 1959.

MR. R. L. BASSET has been appointed a director of Associated Electrical Industries Limited and has resigned from the board of Associated Electrical Industries (Woolwich) Limited.

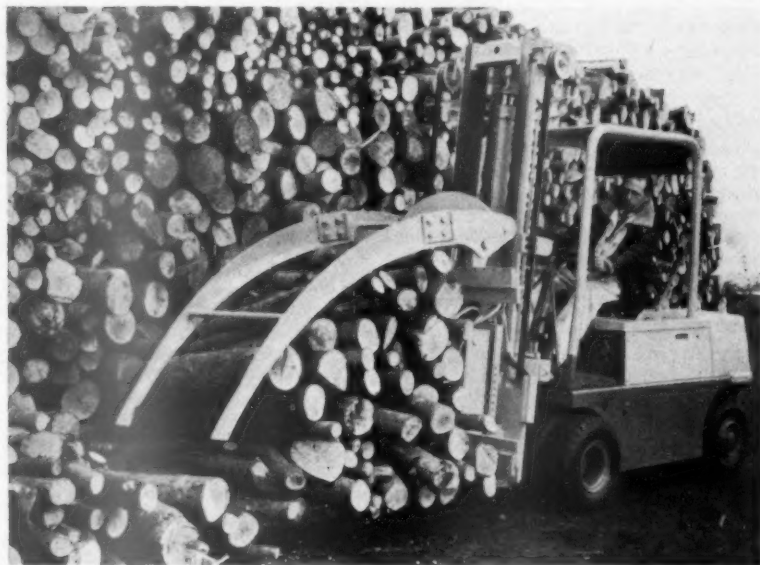
DR. W. DAVIDSON has been appointed in charge of Research & Development, Heating Division, Powell Duffryn Limited.

MR. J. OLDROYD, Secretary of the British Electrical & Allied Manufacturers' Association, has been appointed General Manager of the Lead Development Association.

We regret to record the death, at the age of 74, of SIR ARTHUR CROFT, Chairman of Crofts Engineers (Holdings) Limited, he is succeeded by his son, MR. J. A. CROFT.



# NEW EQUIPMENT *and Processes*



## PIT-PROP ATTACHMENT

A pit-prop attachment, designed primarily to handle pit-props, but claimed to be equally suitable for handling railway sleepers, timber in a rough-sawn state, or even pipes or tubes which can be loose-piled, is hydraulically-operated from the system of the truck to which it is fitted.

The piping requirement is that the truck can run four hoses over its mast and can incorporate two additional valves to control the hydraulic circuit to the rams. It is expected that a standard hanging arrangement will be available for trucks using a plate-type carriage and that this arrangement will add only 1½ in. to the attachment's inherent loss of load centre of 13½ in.

The attachment's forks are rated for a maximum load of 2 tons at 24½ in. from the fork heels, but the true capacity, in terms of a particular truck, can be found from this formula:—

$$A \text{ (lb.)} \times \frac{(B + 15) \text{ in.} + 32,705 \text{ lb./per in.}}{\text{truck-load centre (in.)}} = \text{truck capacity (lb.)}$$

where A is weight of load to be lifted, B is the distance from the rear of the load to its centre of gravity and the factor of 32,705 lb. per in. is a constant obtained by multiplying the attachment's weight (2,110 lb.) by the distance its centre of gravity is set forward from the rear of the hanging bracket, 15½ in.

Basically, the attachment comprises a backplate assembly mounted on the truck, front frame, twin-claw assembly,

and the forks. Four 4-in. bore rams actuate the claws and forks; the rams, with a stroke of 10 in., are anchored to centre-lugs on the front frame and their operation moves the claws through approximately 90 deg. round a pivot point at the top of the frame. The tipping rams have a 5-in. stroke and are anchored to forward-facing plates of the backplate assembly; the ram stroke is sufficient to tilt the entire front plate and fork assembly through 49 deg. of which 5 deg. is above the fork ground line, and 44 deg. below it.

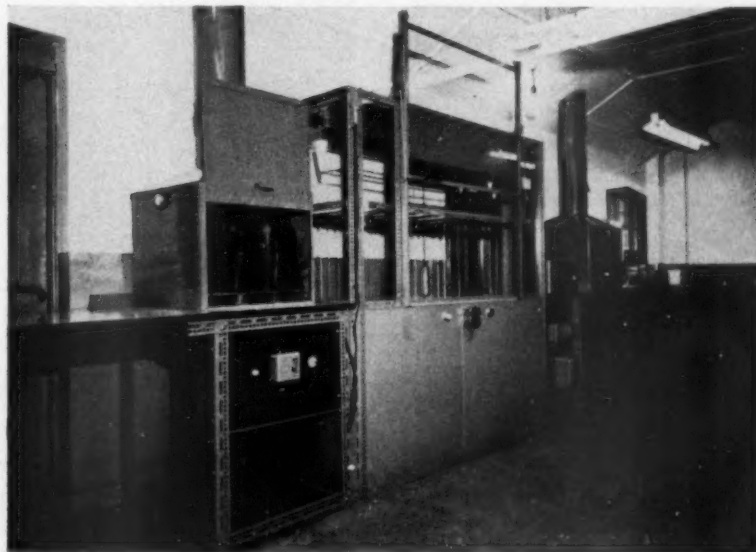
This amount of tilt ensures that the claws can be raised sufficiently to present full fork height when loading, and lowered far enough to retain the load securely; while the fork movement ensures efficient pick-up and transportation, with more than adequate downward tilt for loading. Additionally, the forks can be adjusted over a 20—50-in. range to accommodate loads of varying width. Overall height (closed) and width are, respectively, 65 in. and 55 in. Forks measure 49 in. from heel to toe.

Further details can be obtained from the manufacturer, R. H. Corbett & Co. Ltd., Frindsbury Works, Rochester, Kent.

## ELECTRICAL SAFEGUARDS

One of the safety rules applied in the London Midland Region of British Railways is that the rubber gloves worn by personnel dealing with electrified lines and switchgear must be tested every 90 days.

To cope with the hundreds of pairs of gloves constantly being put through the test at the Chief Mechanical & Electrical Engineer's Department at Wembley, the Electric Traction Engineer, Mr. G. W. Parkin, and his staff devised the Dexion-framed test tank illustrated hereunder. The centre-slotted angle structure contains the water tank in which the gloves are submerged to within 1½ in. of the edge of the gauntlet. The gloves then are filled with water to a similar level. After soaking for 1 hr., each glove is submitted to a 5,000-V. test load for



1 min.; any leakage is indicated by pilot lights. The test rig itself is fitted with safety devices to protect the operators.

The ovens at the side of the tank are for drying the gloves, which are thoroughly washed in a warm detergent solution, before and after testing. Gloves also are checked for other defects and returned for use in virtually new condition.

Further details of this and other applications of Dexion can be obtained from Dexion Limited, Maygrove Road, London, N.W.6.



#### HARDFACING TECHNIQUE

A new method of hardfacing, which will be demonstrated at the forthcoming Engineering, Marine, Welding & Nuclear Energy Exhibition at Olympia, is claimed to produce improved deposits of under  $\frac{1}{16}$  in. in thickness. The spraying apparatus is shown above.

Easily applied, the deposits exhibit the typical structure of sprayed metals but, through a subsequent fusing operation, they are converted to a homogeneous overlay metallurgically bonded to the parent metal. Deposits produced in this way have little variation in thickness and thus demand the minimum consumption of materials and grinding time for finishing.

The deposits are produced by three additions to the manufacturer's existing range of Stellite alloys, and rods of other hardfacing alloys shortly will be available. The rods are manufactured by the Deloro Stellite Limited, of Highlands Road, Shirley, Solihull, Warwicks, and are obtainable with equipment from Metallisation Limited, of Dudley, Worcs.

#### PLASTIC SLEEVING

Sulphurous fumes emitted by steam trains passing under British Railways' bridge at Lodge Road, London, N.W.8, gradually corroded away the supporting steel joists. In the 22 years since the bridge was first opened the damage had become so extensive that a major rebuilding was scheduled.

The fumes caused particularly acute corrosion in the mild steel pipes encasing three 66,000-V. two-core oil-filled high-tension and associated pilot cables laid under the south footway and supported by mild steel R.S.J.'s suspended from the main bridge girders.

The Central Electricity Generating Board decided to take the opportunity of protecting its cables, which form part of the grid system, from further corrosion by replacing the steel pipes with plastic sleeving.

The high-voltage cables, which were first served with a bituminous hessian covering, weighed 70 lb. a yd. and measured 4.14 in. outside diameter. Thirty-six 10-ft. lengths of thermoplastic piping with a bore of 6.06 in. and wall thickness of approximately  $\frac{9}{32}$  in. had to be cut in half longitudinally to instal it on site. The piping was supported at 5-ft. intervals by R.S.J.'s of  $4\frac{1}{2}$  in. bearing, and held in place by galvanised iron U-bolts.

Experiment showed that, after installation, the pipe could be effectively resealed by chamfering the longitudinal cuts to a depth of half the radial thickness and welding in a triangular-section p.v.c. fillet. To avoid oxidation of the p.v.c., an electrically-heated nitrogen welding gun was used in place of conventional equipment.

The lengths were joined by a bell-and-spigot method, in which one end was "belled" by factory pre-heating to accept the next length for a depth of about 2 in.

In addition to the use of a solvent cement to produce a sounder connection, the socket-and-spigot joint was finally sealed off with a p.v.c. fillet weld.

The whole erection was completed by a fitter and two assistants in 14 days—a great improvement on steel pipework in

these circumstances. A similar installation was made by the contractors on another British Railways bridge at Walthamstow, where 100 ft. of piping was used.

Plastic sleeving of this type is ideal for electric cables for it is semi-rigid and needs no earthenware or concrete ducting, sometimes used to prevent leakage to the cable.

The bell-and-spigot joint, together with the perfectly smooth bore of the plastic pipe itself, ensures a snag-free pull-through when cables are installed. This method of sleeving-laid cable would enable two men, working with 20-ft. lengths of pipe, to lay at least 300 yd. a day.

Durapipe is available in bores from  $\frac{3}{8}$  in. to 6 in.

The work was undertaken by Durapipe & Fittings Limited, of West Drayton, Middlesex. Part of it is shown in the illustration below.

#### AEROSOL-PACKED GREASE

The silicone grease MS4, used for protecting and insulating ignition systems and electrical equipment, is available in an aerosol pack under the name Ambersil MS4.

The pack provides a convenient and efficient means for applying the grease, giving a high degree of penetration, and providing a thin, even, protective film.

Further details can be obtained from Amber Oils Limited, 11a, Albemarle Street, London, W.1.

#### PRICE ADJUSTMENTS

Heyes & Co. Ltd., of Wigan, announces that prices of its products have been rationalised in accordance with the simplification of a number of ranges. A simplified pricelist is obtainable.



## Weed Spraying in the North Eastern Region

### Quick and economic control of weeds by specially-synthesised materials

On February 26, a new type of weed-spraying train began its first full year's weed-killing programme in the North Eastern Region of British Railways.

This equipment was first put in service by the Chief Civil Engineer's Department in the Autumn of 1960 when 350 miles of track were experimentally sprayed.

Constructed in the workshops of the Chief Civil Engineer, the train uses a spraying system based on principles pioneered by Fison's Pest Control Limited and described in our issue of March 20, 1959. It comprises five vehicles, a guard's van, a covered van to convey the weed-killing chemicals, two converted locomotive tenders as mobile water tanks, and a spray coach. All the vehicles are fitted with vacuum brakes to permit high-speed movement between spraying locations.

The spray coach is a former passenger coach converted to house operating, pumping, mixing, and staff accommodation compartments.

In the operating section are fitted the control valves to the spray bars and nozzles, while in the pumping and mixing compartments are mounted the main, mixing, and metering pumps and two 80-gal. mixing and storage tanks.

#### Staff accommodation

The staff accommodation is divided into a kitchen fitted with sink unit, calor-gas water heater, cooker, refrigerator, and cupboards; a dining and sitting room, sleeping quarters, and toilet.

When spraying operations are being undertaken, the weed-killing chemicals are mixed in powder form with water in the 80-gal mixing tank in the spray coach. The concentrated mixture is then transferred to the adjacent 80-gal. storage tank by a 40-45 g.p.m. Sigmund pump.

Simultaneously, water is pumped from the tenders (coupled immediately behind the spray coach) by a Sigmund 6,000 g.p.h. single-stage centrifugal diesel-driven pump, a belt drive from which also operates the transfer pump between the mixing and storage tanks. At the same time, the concentrated weed-killer is metered into the water supply on the suction side of the main pump by a Fison's 35 three-ram meter pump drawing from the storage tank. Driven by the coach axle, this pump introduces the weed-killing concentrate into the water supply at the correct rate for the speed of the train and is efficient between a speed range of 5 to 30 m.p.h.

The mixture is finally forced out through the spray bars and nozzles at a regulated pressure and constant volume.

Where the train has to be stopped at signals, or passes through tunnels, provision is made by means of coupled valves to recirculate the mixture within the system.

It is possible to spray up to a maximum width of 20 ft.—i.e., 10 ft. on either side of the centreline of the track.

A week's supply of the weed-killing compound can be carried in the train, while the two water carriers have a combined capacity of 8,000 gal., sufficient for approximately 50 to 60 miles of track-spraying.

Commencing in the Newcastle area, the train will operate throughout the North Eastern Region, ending its Spring tour in the West Riding after having covered 2,050 miles of track in 31 days of actual spraying. During the operations, the train will put down 37,838 lb. of weed killer.

Each day's work will be logged and a description of the track and the methods of spraying noted to assist future planning and operation.

In mid-April the train will be loaned to the Scottish Region.

### Level-crossing barrier display

A new railway level-crossing barrier which is electro-magnetically operated, will be on show for the first time at the Electrical Engineers Exhibition at Earls Court on March 21-25. Only one of the half road-width automatic crossings is as yet in operation. It is in the London Midland Region, at Spath Crossing, near Uttoxeter.

The barrier will be a highlight of the British Transport Commission exhibit in this year's special feature, which is "Communications." It will stand next to a section of full-size switching track and the barrier can be operated by visitors to the exhibition. Next to the portion of track will be a length of 1961-style platform, incorporating the latest station lighting developments. There are some 4,000 manually-operated main level-crossings in Britain, and wages for the crossing-keepers amount to about £1 million a year. It is not yet certain how many of the automatic crossing gates will replace the manual ones. The barriers were described in our issue of February 10.

### A.E.R. reunion dinner

The Army Emergency Reserve (Transportation) Officers' Reunion Dinner was held at the Cafe Royal, London, on February 24. The chair was taken by General Sir Brian H. Robertson, Bt., Honorary Colonel of Transportation, A.E.R., who, in proposing the toast of the guests, referred to the drastic reorganisation in progress. The problem presented by the reserve army was more difficult than that of the regular army and the War Office was wise in devoting much thought to the matter. The most drastic reorganisation would be that of the port units. The number of volunteers coming forward to the A.E.R. was not what it should be, possibly due to a mistaken impression that joining could be detrimental to a career; he assured those in the service of British Railways that this most certainly was not the case. Sir Brian Robertson stressed that it was right in principle that

those prepared to come forward in Category 1 should do so as a unit.

Sir Richard Way, Permanent Under-Secretary of State for War, replying on behalf of the guests, said that the operation of reorganising the army and the reserve was difficult, and never lacking critics. It was no longer possible to imagine a conventional war and in atomic warfare reliance must be placed upon a small Regular Army with the vital corollary of a strong reserve; of this reserve the A.E.R. Category 1 formed a most important part. Whereas the ceiling in this category was 15,000, the present strength was 4,000. Men had to be obtained and to get them reliance must be placed upon the goodwill of those able to influence young men to join.

## Staff & Labour Matters

### Railway Staff National Tribunal

At the invitation of the British Transport Commission and of the three railway trade unions, Mr. Roy M. Wilson, Q.C., has accepted the Chairmanship of the Railway Staff National Tribunal in succession to Sir Ronald Morison, Q.C., who has found it necessary to relinquish that office owing to pressure of other commitments.

## Questions in Parliament

### Cost of Season Tickets

Mr. F. C. Gough (Horsham—Con.) asked the Chancellor of the Exchequer on February 21, if he was aware of the burden imposed on a large proportion of office workers by the recent increase in the cost of season tickets; and if he will direct the Board of Inland Revenue to allow the cost of annual season tickets, to and from the place of employment, to be charged against Income Tax as a normal business expense.

Mr. Selwyn Lloyd replied that he would consider the suggestion among many others made in connection with the forthcoming Budget.

### Baschurch Railway Crash

Mr. G. Nabarro (Kidderminster—Con.) asked the Minister of Transport on February 22 whether he would make a statement concerning the railway crash which occurred, involving fatalities, at Baschurch, Salop, on Monday evening, February 13, 1961.

In a written answer, Mr. Marples said, at about 7.45 p.m., on February 13, the 5.16 p.m. Cosford to Chester Down express passenger train collided at some speed with the leading vehicle of a Down freight train at Baschurch, on the main line between Shrewsbury and Chester. The freight train had to be backed into a refuge siding for the passenger train to pass, but it was not completely in the siding when the collision occurred. The engine of the passenger train turned over, and the leading vehicle, a stores van, was thrown on top of it. The van caught fire and the fire spread to the first passenger coach. Unfortunately, three railwaymen, including the driver and fireman of the passenger train, were killed. One railwayman was in hospital with serious injuries. Two of the 22 passengers, and four other railwaymen, received slight injuries. The relief services arrived quickly. The Up and



Down lines were blocked until 1.30 p.m. the following afternoon when through working was resumed.

Colonel McMullen, an Inspecting Officer of Railways, opened a formal Inquiry into this accident on February 21, at Shrewsbury.

#### Apprenticeships

Mr. F. Lee (Newton—Lab.) asked the Minister of Labour what proportion of those leaving school during the past three years took out apprenticeships.

Mr. John Hare, replying, said, in 1957, 36.6 per cent of boys and 7 per cent of girls; in 1958, 34.4 per cent of boys and 6.9 per cent of girls; and in 1959, 33.6 per cent of boys and 7.4 per cent of girls. The figures for 1960 are not yet available.

The industries in which boys and girls started work as apprentices included Transport & Communication: boys 2,622 in 1957; 2,167 in 1958; 2,210 in 1959; girls, 159 in 1957; 140 in 1958; and 232 in 1959.

Mr. Lee said that these figures showed that most of the school-leavers were going into blind-alley jobs. Was not the "bulge" a once-for-all opportunity which, if it was missed, would result in a dearth of skilled people for a long period ahead?

Mr. Hare pointed out that there were 5,500 more apprenticeships for boys in 1959 than in 1958. The 1960 figures should be available in the next two or three weeks, and he was hopeful that they would show an increase in both the number and the proportion of boys and girls entering apprenticeships and learnerships.

## Parliamentary Notes

#### Rail Services for Airports

The railway services from London and Gatwick Airports were subjects covered in a debate in the House of Lords, on February 23, on London region air traffic.

Lord Ogmore said that once one arrived at an airport, particularly London Airport, it took an extraordinary time to get into London. How could this be reduced?

#### Praise for Southern Railway

Lord Shackleton said that however costly this problem of the rail link with London Airport might be, he did not think they could put it off forever. The Millbourn Committee recommended a rail link.

Lord Lindgren, ex-railway clerk and ex-junior Minister, said, of the link between the city centre and London Airport, it was the case that a tube, railway, monorail, or whatever it might be, could not be provided on a viable basis.

Viscount Colville of Culross said that the really successful access to Gatwick was by the Southern Region railway service, which was very efficient and frequent and was immediately adjacent to the airport terminal.

Lord Mills, the Paymaster-General, said that in regard to the question of a link between Heathrow and the centre of London, the Government fully appreciated the importance of enabling passengers to travel easily and quickly between airports and city centres, and to this end had set in motion a big programme of road improvements.

Lord Teynham has given notice that he will call attention in the House of Lords on

March 8 to Command Paper 1248 and the organisation of the nationalised transport undertakings.

## Closing branch lines

A meeting of the Transport Users' Consultative Committee for the Yorkshire Area was held in the Midland Hotel at Bradford on February 28.

The Chairman of the Committee, General Sir Roy Bucher, referred to a tour just completed with the object of enabling the Yorkshire Transport Users' Consultative Committee to see at first hand, the Worth Valley, its railway, its bus services and the problems raised by British Railways' proposal to close this line. As a result, the members were all the better able to visualise the problems which beset the transport industry as a whole in such an area, and to appreciate the underlying reasons why the railway had made its case for closure. If and when British Railways re-submitted the case after the diesel service has been in operation for 12 months, the committee would be in a better position to consider the case.

He emphasised that the proposal to close the Worth Valley line was first submitted to the committee in July, 1959. Full consideration had been given to the very great weight of evidence put forward by the advocates for the retention of the service, and the line remained open for traffic. This was due to the willingness of the railway officers concerned to give full consideration to the points put forward, and the very fact that the diesel passenger service was in operation, as suggested by some of the advocates in favour of the retention of the line, indicated the value to the community of this committee as an arbiter in these matters.

#### Discussion with T.U.C.C.

Mr. F. C. Margetts, Assistant General Manager (Traffic), North Eastern Region, said that stations and sections of line were closed only after submission to and discussion with the Transport Users' Consultative Committees.

Withdrawal of passenger services attracted more opposition than the withdrawal of other facilities. Far too often had it been assumed that the multiple-unit diesel was the answer. Because in some places there had been spectacular increases in travel, it had come to be accepted outside rail circles that this must be true everywhere and that diesels must always pay. But there were areas, mostly rural, where the volume and potential volume of passenger travel was not sufficient even to justify the continuance of a diesel service. In some even a bus service would not pay, at least on a daily basis.

Where more travel could be really handled and made more profitable, this would be done. The Trans-Pennine service, which had shown an increase of over 30 per cent revenue in the North Eastern Region, was typical of what had been done.

It was in rural areas that people wanted rail transport every now and then. They expected, and some even demanded, what might be called a "stand-by" service for use principally on market-days, at week-ends, at times when roads were difficult to use at holiday times.

The Commission could not continue to provide services for a few people who would

use them at their convenience. The two basic causes of poor traffic in rural areas were the growth of private road transport and the sparseness of population.

Some might argue that there was a moral obligation on the railways to provide a service. But could it be a paying service? If not, how was it going to be paid for? Great efforts had been made on some doubtful lines in the North-East to provide a paying service. Only after some years of diesel running with very low fares had the decision been reached that a number of services must be withdrawn. These services had not been, and would not be, withdrawn in an arbitrary manner. Full investigation was made into receipts and costs, into potential losses through the withdrawal of the service.

This problem was not always one connected with rural areas. Short branch lines in localities where fares were held down by bus and other competition, and where travel was of a "peak" variety associated chiefly with work, were also losing propositions.

The results from the steps taken by the Region from 1950 until the end of 1960 were:

	1950-60	
	Number	Mileage
1. Branches closed to passenger traffic ... ..	19	304
2. Branches closed to passenger and freight traffic and abandoned ... ..	7	116
3. Freight branches abandoned ... ..	17	132
4. Stations closed to passenger traffic ... ..	212	—
5. Stations closed to passenger and freight traffic ... ..	78	—
6. Stations closed to freight traffic ... ..	95	—

These figures had to be considered against the background of the 1,338 route-miles of line open for passenger services and 378 stations which handled passenger traffic in this region. Many more passenger services—some of them diesel-operated—and many stations would come under review. Despite great efforts, the number of passengers travelling by rail was still falling in the Region as a whole. Where the railway could improve services and reap a financial advantage it would. Elsewhere on the rural lines, on the short distance lines in industrial areas, and even in the fields of holiday relief trains and excursions, there would have to be a drastic pruning; a pruning designed to strengthen the system and increase the vigour of its remaining arteries.

## Track maintenance exhibition

Organised jointly by the Netherlands Railway and the Verband Deutsche Eisenbahningenieurung of Germany, the "International Exhibition of Mechanical Tools for the maintenance of track for railway engineering staff" will be held at Elst, Holland, from March 20 to 25 inclusive. Its object is to provide the opportunity to compare types of mechanical tools for the maintenance of track.

Exhibits will include tamping machines, heavy and light, with lifting equipment; a grinding train; ballast-cleaning machines; crib-cleaning machines; rail grinding equipment; weed-killing trains; sleeper drilling machines; sawing machines; power wrenches; rail-loading equipment; sleeper loading equipment; ballast bed grader; small record-

ing cars. Exhibits will be provided by British and Continental manufacturers.

The British Transport Commission is sending films which will be included in a continuous performance of English, German, and Dutch films.

The Permanent Way Institution is sending a party of over 400 members, who will leave on March 24 and return on March 26. This party will include the following officers of the British Transport Commission and British Railways:—

Mr. A. K. Terris, Chief Civil Engineer, Eastern Region, British Railways; Mr. E. C. Cookson, Assistant Civil Engineer, Western Region; Mr. A. C. Edrich, Civil Engineer (Maintenance), London Transport Executive; Mr. R. H. Edwards, Civil Engineer, Barry Docks; Mr. G. D. S. Alley, Assistant Engineer (Permanent Way), Western Region; Mr. H. H. Robinson, Assistant Engineer (Permanent Way), Eastern Region; Mr. D. Robertson, Assistant (Permanent Way), Scottish Region; Mr. W. A. C. White, Assistant, Permanent Way, Southern Region; Mr. J. A. R. Turner, Assistant, Chief Civil Engineer's Department, British Transport Commission.

Mr. D. A. S. Conran, Assistant, Development, in the Chief Civil Engineer's Department, British Railways Central Staff, and Mr. A. J. Ticehurst, Plant Assistant, Chief Civil Engineer's Department, Western Region, British Railways, Mr. J. E. Bentley, Plant Assistant, Chief Civil Engineer, Eastern Region; and Mr. P. T. Somerville-Large, Civil Engineer of Coras Iompair Eireann, also will be in the party. Mr. Conran, Mr. Ticehurst, and Mr. Bentley will leave on March 21 and return on March 23. So many visitors to the exhibition are expected that it has been considered necessary to "stagger" days of inspection.

Countries participating in the exhibition are Great Britain, Switzerland, Denmark, Germany, Holland, Sweden, France, Italy, Austria, Belgium, and Luxembourg.

## CONTRACTS & TENDERS

British Railways, Eastern Region, has placed the following contracts:

Coulson & Son Ltd.: building work in connection with new sub-stations at March (Whitemoor)

W. & C. French Limited: remedial works in connection with bank slip between Colchester and Ardleigh

Wm. Proctor & Sons Ltd.: reconstruction of awnings over platforms Nos. 1 and 2 at Boston Station

Eley & Wesley: maintenance and small construction building works in the Ipswich district

Charles R. Price: maintenance and small construction building works in the Doncaster district

Fullers (Builders) Limited: erection of a block of four single-storey coal order offices at Ilford

C. L. Sewell: maintenance and small construction building works in the Peterborough district

Fosters Builders: maintenance and

small construction building works in the Peterborough district

F. Coles (Builders) Limited: maintenance and small construction building works in the Peterborough district

Charles R. Price: maintenance and small construction building works in the Sheffield district

Carter-Horseley (Engineers) Limited: works in connection with the maintenance of bridges in the Eastern Region

W. & C. French Limited: provision of ticket office and temporary station entrance at Finsbury Park Station

G. Chessman Limited: erection and completion of a new single-storey extension to the staff hostel at Scunthorpe.

### BOARD OF TRADE

The Export Services Branch, Board of Trade, has received calls for tenders as follows:—

#### From Formosa:

1 diesel generator single-phase, 220-440 V, 35 kVA.

20 items of signalling equipment including gate controls, track relays, bulbs, soda cells, terminal boxes, and meggers.

The issuing authority is the Central Trust of China, Purchasing Department, 68 Yen Ping Nan Road, Taipei, Taiwan, to whom bids should be sent. The tender No. is CP4D-978. The closing date is March 23, 1961. The Board of Trade reference is ESB/5566/61/I.C.A.

#### From Iran:

100 Swedish Model A-K-50 acetylene gas bottles.

The issuing authority is the Purchasing Department, Iranian State Railways, Tehran, to whom bids should be sent. The tender No. is 39/1401. The closing date is March 15, 1961. The Board of Trade reference is ESB/6022/61.

#### From Pakistan:

40 18-in. "E" type (engine and tender) vacuum cylinders complete.

The issuing authority is the Chief Controller of Stores, Pakistan Eastern Railway (Eastern Bengal Railway), Pahartali, Chittagong, to whom bids should be sent. The tender No. is P5/EVB/41/60. The closing date is April 15, 1961. The Board of Trade reference is ESB/6451/61. No further information is available at the Board of Trade.

18 tons of rivets, black pan head, 1½ in. x ¾ in.

16 tons of rivets, black pan head, 2 in. x ¾ in.

15 tons of rivets, black pan head, 2½ in. x ¾ in.

23 tons of rivets, black pan head, 1 in. x ¾ in.

14 tons of rivets, black pan head, 1 in. x ½ in.

The issuing authority is the Chief Controller of Stores, Pakistan Eastern Railway, Pahartali, Chittagong, to whom bids should be sent. The tender No. is P2/GB1/300/61/ACST. The closing date is March 15, 1961. The Board of Trade reference is ESB/5543/61.

140 outer buffer (BG) steel springs.

The issuing authority is the Chief Controller of Stores, Pakistan Eastern Railway (Eastern Bengal Railway), Pahartali, Chittagong, to whom bids should be sent. The tender No. is P5/ACST/EB1/22/60. The closing date is April 15, 1961. The Board of Trade reference is ESB/6450/61.

23 tons of mild steel angles, 2 in. x 2 in. x ½ in.

21 tons of mild steel angles, 2½ in. x 2½ in. x ½ in.

The issuing authority is the Chief Controller of Stores, Pakistan Eastern Railway, Pahartali, Chittagong, to whom bids should be sent. The tender No. is P2/GB4/99/59/ACST. The closing date is March 25, 1961. The Board of Trade reference is ESB/5542/61.

#### From the Philippines:

6,000 rails each 75 lb. x 20 m.

6,300 pairs angle joint bars

25,200 track bolts with nuts ¾ in. x 4½ in.

40,000 track bolts with nuts ¾ in. x 4 in.

65,000 nut locks for ¾ in. bolts

240,000 track spikes ¾ in. x 4½ in.

The issuing authority is the General Manager, Manila Railroad Company, Manila, to whom bids should be sent. The closing date is March 15, 1961. The Board of Trade reference is ESB/6095/61.

10 kegs track, bolts with nuts, ¾ in. x 3½ in. for 45 lb. rails in 200 lb. kegs

500 sacks track, bolts, with square nuts, heavy series, ¾ in. x 4 in. ASCE for 65 rails, in 100 lb. sacks

240 sacks track, bolts ¾ in. x 4½ in. with square nuts, heavy series, for 75 rails in 100 lb. sacks

5 kegs washers, spring, packerised, H.P., for ¾ in. track bolts, in 2,000 kegs

4,500 angle bars, open hearth, steel, 24-in. long to fit 65 ASCE rail section, No. 6540 with bolt holes, 4½ in. drilling centre to centre.

The issuing authority is the General Manager, Manila Railroad Company, Manila, to whom bids should be sent. The tender No. is 5. The closing date is March 6, 1961. The Board of Trade reference is ESB/5600/61.

#### From Korea:

880 tons of steel rails, 30 lb. new and unused, flat bottom, in lengths of 33 ft., with splice bars, track bolts, and so on

330 tons of steel rails, 20 lb., flat bottom, in lengths of 33 ft., with fishplates, track bolts, and so on.

The issuing authority is the Office of Supply, Government of the Republic of Korea, Seoul, Korea, to which bids should be sent. The tender No. is 1822-S. The closing date is March 22, 1961. The Board of Trade reference is ESB/30421/60/I.C.A.

Further details relating to the above tenders together with photo-copies of tender documents, unless otherwise stated, can be obtained from the Branch (Lacon House, Theobald's Road, W.C.1).

The Director General of India, Store Department, Government Building, Bromyard Avenue, Acton, London, W.3, is calling for tenders for the supply of laminated springs. For further information relating to this tender see the official notice on page 264.

## NOTES AND NEWS

**Television train.** The duration of the tour being undertaken by the special train chartered by Westward Television from the Western Region of British Railways, which was described in our February 17 issue, is from February 13 to March 25 and not, as stated, from February 17 to February 20.

**"Frictionless" not "functionless."** We regret that in the obituary notice of Mr. G. H. Pearson in last week's issue, he was said to be "responsible for the design of the functionless drawbar spring for the Great Western dynamometer car." This should have read "frictionless drawbar, etc."

**Cheap day return fares.** British Railways, North Eastern Region, has announced that cheap day return fares have been introduced between Cottingham, Beverley and Brough. A cheap day return fare has also been introduced between York and Brough (via Selby) and also between Withernsea and Beverley.

**London's "Easter Princess."** The winner of the competition to find London's "Easter Princess," the highlight of the Easter Parade on April 2, in Battersea Park, will enjoy the hospitality of the States of Jersey Tourism Committee, together with a chosen companion, for a springtime holiday for one week, and receive £50 spending money.

**New cold store at Hornsey.** On January 23, Mr. A. A. Harrison, Assistant General Manager, British Railways, Eastern Region, performed the opening ceremony of the

recently completed fish, meat and poultry cold store of Aubrey Green (Billingsgate) Limited, in Hornsey goods depot.

**Branch lines to close.** The Paddock Wood to Hawkhurst line and the Kent and east Sussex line from Robertsbridge to Tenterden, in the Southern Region, will be closed from June 12.

**The Railway Benevolent Institution.** At the February meeting of the Board of the Railway Benevolent Institution, annuities were granted to two widows and a member, involving an additional liability of £66 14s. a year. Some 138 gratuities were also granted amounting to £1,306 10s. to meet cases of immediate necessity. Grants made from the Casualty Fund during January amounted to £1,485 9s.

**Acquisition by G. D. Peters.** Agreement has been reached for the purchase by G. D. Peters & Co. Ltd. of Slough, of all the issued capital of Kennedy & Kempe Limited of Longparish, near Andover. Both companies carry on long-established engineering businesses, and the boards consider the merger will prove beneficial to both parties.

**York Station Christmas tree appeal, 1960.** The York Station Christmas tree (1960) collections in aid of local hospitals and charities, together with supporting efforts and donations by local railway staff, raised the sum of £592. This amount, the highest figure since 1948, is £31 more than the previous year. Toys and gifts placed in the baskets near the

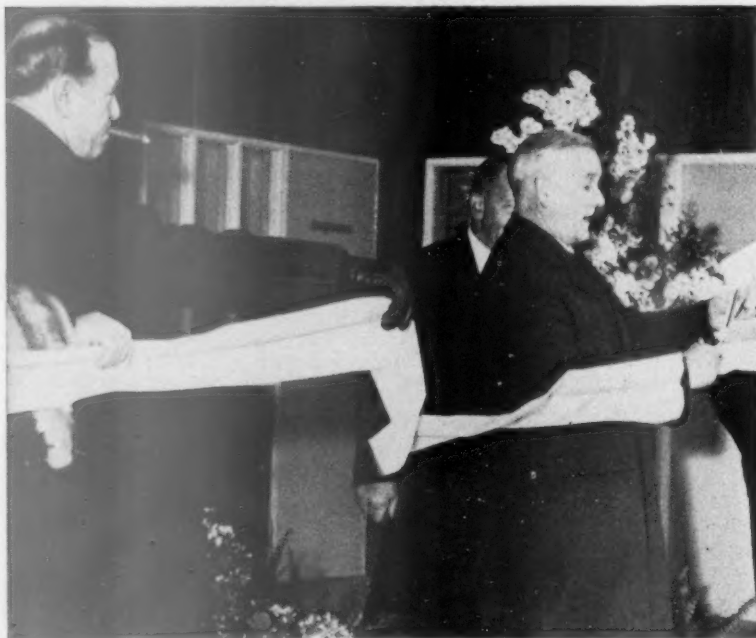
Christmas tree totalled 892, the highest number collected since the introduction of this appeal in 1935. The working models at the Christmas tree produced £241 6s., which means approximately 58,000 pennies were dropped into the slots.

**"Starlight" travel.** British Railways "Starlight Special"—the night excursions between London and Scotland—will be in service at Easter and during the summer holiday season. There will be departures on Thursday, March 30, from London (Marylebone) and on Good Friday, March 31, from Glasgow (St. Enoch) and Edinburgh (Waverley). The excursions will be resumed in each direction on Fridays during the summer from May 19 to September 8. Passengers may return on Saturdays a week or a fortnight after departure.

**Rozalex at Olympia Engineering Exhibition.** Industrial and other skin cleansers and stain-removing creams manufactured by Rozalex Limited will be shown at the Engineering, Marine, Welding & Nuclear Exhibition at Olympia, London, on April 20-May 4. They include Rozalex Resin Removing Cream for cleaning off synthetic resins and glues widely used in industry. Also exhibited will be Rozalex barrier creams, suitable for all occupations. Applied before work, these help to prevent occupational dermatitis.

**Augmented sailings to and from Ireland.** British Railways, Western Region, has announced that the daily steamship service between Fishguard and Rosslare Harbour (Sunday nights excepted) will be re-introduced on June 5 and operate until September 23, 1961. To cater for the demand for additional facilities for the conveyance of motorcars, and accompanying passengers, between Fishguard and Rosslare Harbour, new mid-day sailings are being introduced twice weekly on July 4 until September 7. The additional sailings, which will start at 12 noon from both Fishguard and Rosslare, arriving at 3.15 p.m., will operate on either Tuesdays and Wednesdays or Wednesdays and Thursdays.

**"Me and My Girl."** An excellent performance was given at the Scala Theatre, London, W.1, from February 22 to 25, by the Great Western Railway (London) Operatic Society of Noel Gay's famous musical comedy "Me and My Girl." This was the first occasion that this popular production, which was originally produced at the Victoria Palace in 1937, has been staged at the Scala Theatre. In the role of Bill Snibson, originally created by Lupino Lane, Walter Jenkins, the Goods Agent at British Railways' Victoria & Albert Docks, gave an excellent performance, and Vicky Cuthbert, from the Chief Establishment & Staff Office, and Ronald Ratcliffe, of the Public Relations & Publicity Department of the Western Region, at Paddington, were very well cast in the parts of Sally Smith and Sir John Tremayne. The Duchess of Dene was cleverly portrayed by Jane Munday, Gerald Bolingbroke by Michael Stevens and Jacqueline Carston by Vivien Barrett, all of whom well merited the enthusiastic reception accorded the performance. Sixty members of the society formed the supporting cast and chorus, and the choreography was by Alison Maclaren;



Mr. A. A. Harrison opening the new cold store in Hornsey Goods Depot



the orchestra was under the direction of Norman Bidgood. The producer was Frederick Toon, a member of the staff of the Chief Civil Engineer at Paddington.

**Institute of Transport, Western Section annual dinner.** The annual dinner of the Western Section of the Institute of Transport took place at the Royal Hotel, Bristol, on February 16, 1961. The President of the Institute, Mr. K. W. C. Grand, responded to the toast "The Institute of Transport" proposed by Mr. C. Mudge, President, Bristol Incorporated Chamber of Commerce & Shipping. Mr. L. P. F. Hubbard, Divisional Road Engineer, Ministry of Transport, proposed "The City, County and Port of Bristol," and the Lord Mayor of Bristol, Alderman A. Hugh Jenkins, J.P., responded. The toast "Our Guests" was proposed by Mr. J. C. Gregory, Immediate Past Chairman of the Section, and the response was given by the Sheriff of Bristol, Councillor G. E. Maggs. Mr. H. Bastin, Chairman of the Section, presided.

**Goods depots to close.** The London Midland Region of British Railways announces that the following goods depots will be closed on March 6, 1961: Ashley (traffic will be dealt with at Manchester or Hale); Cummersdale (traffic will be handled at Carlisle Dentonholme); Manley (traffic will be dealt with at Chester General or Mouldsworth). The Woodside siding (Halebank) coal depot between Runcorn and Liverpool will be closed. Only coal class traffic is handled and this will be dealt with at Ditton, Garston Central, or as consigned.

**R.C.T.S. Vale of Belvoir tour.** The East Midlands Branch of the Railway Correspondence & Travel Society has arranged a tour by diesel train on April 29 over lines in and around the Vale of Belvoir which are closed to passenger, or used only for ironstone, traffics. Departure is from Nottingham Midland Station at 1.40 p.m. The route is via Sneinton Junction, Nottingham Exchange sidings, Trent Lane Junction, Saxondale Junction, Stathern Junction, Newark Northgate, Barkston north and south curves, High Dyke Junction, Stainby, Grantham Canal Yard, Belvoir Junction, Denton, Bottesford east curve, Scalford Junction, Waltham-on-the-Wold, Eaton mines, Wycomb Junction, and Holwell sidings, with arrival at Nottingham Midland about 8.30 p.m. Details may be obtained by sending a stamped addressed envelope to the Secretary, Mr. V. Forster, 90, Abbey Road, Beeston, Notts.

**R.C.T.S. visit to Swindon.** The Railway Correspondence & Travel Society has arranged a visit to Swindon Works on April 9. A special "cross-country" diesel set will leave Paddington at 9.15 a.m. The route outwards is via Windsor and Slough West Curve. After the visit to Swindon Works, the special train will traverse the Malmesbury, Highworth, Faringdon, and Wallingford branches, and is due Paddington about 8.30 p.m. Buffet facilities will be available throughout the tour. Passengers may join the train at Paddington, Windsor, or Reading. Fares, including printed itineraries, are 27s. 6d. (15s. for children under 14) from Paddington; 22s. 6d. (12s. 6d.) from Windsor; and 20s. (11s. 3d.) from

Reading. Applications should be sent with remittance and stamped addressed foolscap envelope to Mr. J. Miller, 65, Hollington Crescent, New Malden, Surrey. Non-members of the Society are welcome.

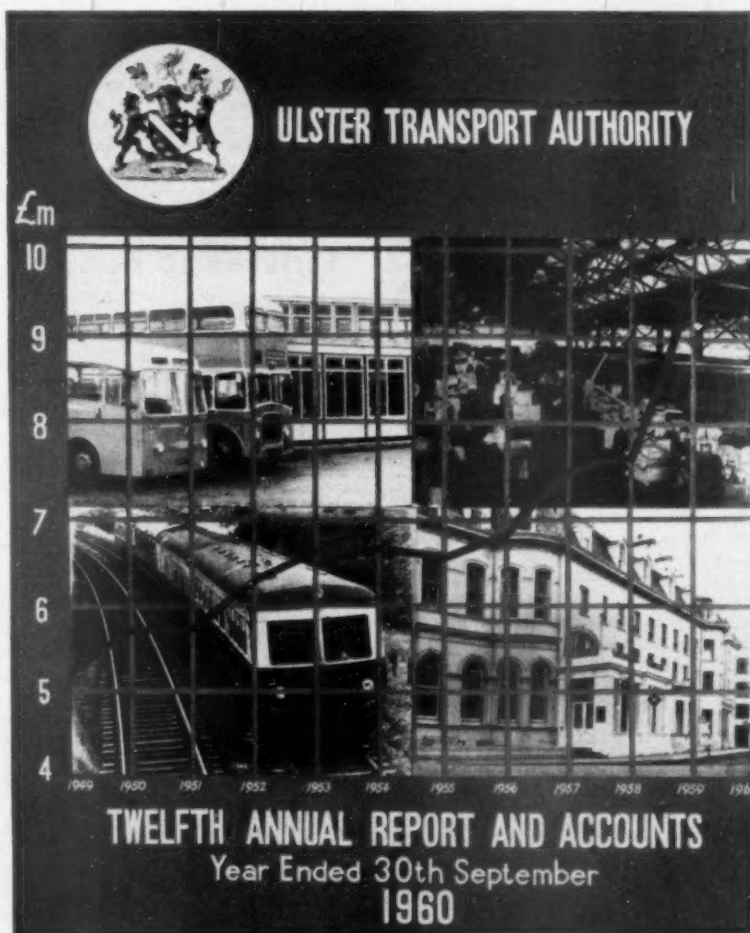
**Special trains for the Grand National.** Three special trains, two first class only and the other second class only, will be run by the London Midland Region from Euston to Aintree Racecourse Station and back on March 25 for the Grand National. Tickets, which include a reserved seat on the train in each direction, breakfast, luncheon and dinner, can only be obtained in advance, and will cost £7 15s. and £4 10s. second class. Special trains will also run to Aintree from Watford and St. Albans.

**Craven concentrates effort.** The Victoria Works at Denton, Lancashire, of Craven Bros. (Manchester) Ltd., together with all machinery and equipment, have been sold to J. Brockhouse & Co. Ltd., of West Bromwich. These works were purchased in 1938 for work which was abandoned as a result of the war, since when they have been used to produce some of the company's smaller products. Finding it desirable to concentrate the production of modern machine tools, Craven plans to consolidate activities at the principal works at Reddish, Stockport.

**New cover for Ulster Transport Authority report.** Below is illustrated the new cover for the U.T.A. report for the year ended September 30, 1960, on which editorial comment is made on page 240 of this issue. Four aspects of the Authority's activity are depicted: the bus station at Oxford Street, Belfast; sorting and loading at Grosvenor Road goods depot, Belfast; the diesel multiple-unit "Enterprise," and the Northern Counties Hotel, Portrush.

**World Bank loan to Costa Rica.** The World Bank has approved a loan equivalent to \$8.8 million for the expansion of electric generating and transmission facilities in Costa Rica. The 25-year loan was made to the Institute Costarricense de Electricidad (I.C.E.), an autonomous Government corporation, which owns and operates 52 per cent of Costa Rica's electric generating capacity.

**Automation conference.** Viscount Hailsham, Minister of Science, will open the first British conference to consider the purely social and economic effects of automation, to be held in Harrogate on June 27-30 with the title "Automation: Men and Money." Eight of the member organisations of B.C.A.C. (British Conference on Automation & Computation) have formed a



Cover of twelfth annual report and accounts of the Ulster Transport Authority

sponsoring committee; they are the British Institute of Management, British Productivity Council, Department of Scientific & Industrial Research, Institute of Cost & Works Accountants, Institute of Personnel Management, Institution of Production Engineers, Tavistock Institute of Human Relations, and the Trades Union Congress. Speakers on the social aspect in the wider context will include Mr. W. J. Carron, President of the Amalgamated Engineering Union. The wider economic effects will be examined by, amongst others, Mr. W. B. Reddaway, Director, Department of Applied Economics, University of Cambridge, and Mr. E. F. Schumacher, Economic Adviser, National Coal Board. Among authors of papers on the social implications within a firm will be Mr. J. L. Jones, Midlands Regional Secretary, Transport & General Workers Union, and Dr. J. M. MacDonald, Chief Medical Officer, the Ford Motor Co. Ltd. The internal economic effects will be discussed by Mr. A. L. Stuchbery, Chief Technical Engineer, Metal Box Co. Ltd., and others. Speakers who present case studies on the last day will include Mr. A. A. Jacobson, Works Manager, Roneo Limited, Norwich (internal economic aspects). Sir Walter Puckey, Chairman of B.C.A.C., will preside at the conference, which is administered by the British Institute of Management.

## Railway Stock Market

A cheerful trend was again shown in stock markets where industrial shares moved higher in contrast with an easier tendency in British Funds which were affected by competition from the big offer of steel companies' debentures and preference shares at prices offering above-the-average yields.

Among foreign rails, Costa Rica ordinary stock changed hands around 43, Chilean Northern 5 per cent first debentures were 51½ and Guayaquil & Quito assented bonds 49½. Brazil Railway bonds were 4½, and Paraguay Central prior debentures 17½.

Elsewhere, United of Havana second income stock remained at 6½; business at ½ was shown in the consolidated stock, but a feature has been an advance in San Paulo Railway 3s. units to 1s. 6½d., compared with 10½d. a week ago. Mexican Central "A" bearer debentures firmed up from 59½ to 60.

The large yields attracted some attention to Antofagasta stocks, the preference which yields 13½ per cent, improving from 36 to 36½, though the ordinary stock at 16½ was fractionally lower compared with a week ago; the 4 per cent perpetual debentures were 46½. International Railways of Central America rallied from \$18½ to \$21½, and the preferred stock was \$105.

Canadian Pacific which, as usual, moved closely with Wall Street markets, strengthened from \$41½ to \$42. The 4 per cent preference stock rallied from 57½ to 58½, and the 4 per cent debentures were 59, compared with 57½ a week ago. White Pass shares were again \$10½.

Nyasaland Railways shares held their improvement to 10s. 6d., the 3½ per cent debentures were 35½. Midland of Western Australia ordinary stock changed hands at 7½. West of India Portuguese capital stock was 116½ and Barsi ordinary stock remained at 15.

Among shares of locomotive builders, engineers, and kindred companies, Birmingham Wagon, which remained under the influence of the news that no dividend can be paid, were 22s. 1½d., compared with 23s. a week ago, but Charles Roberts 5s. shares rallied afresh from 8s. 3d. to 9s. 3d. Moreover, Gloucester Wagon 10s. shares gained 6d. at 10s. 6d., though Wagon Repairs 5s. shares eased 3d. to 19s. 6d. G. D. Peters were 20s. and Beyer Peacock 5s. shares remained around 7s. North British Loco. at 6s. 1½d. were also virtually unchanged compared with a week ago.

English Electric, which again reflected satisfaction with the results, were 33s. 9d. In other electricals, A.E.I. have strengthened from 40s. 3d. to 42s. and G.E.C. from 31s. 3d. to 31s. 6d. Mather & Platt reacted sharply following the results, but later made a partial rally to 49s. 3d., which compared with 52s. 3d. a week ago. Crompton Parkinson 5s. shares have been firm at 12s. 9d. and B.I. Cables changed hands around 56s.

Activity and strength of Ransome & Marles 5s. shares, which on balance advanced from 17s. 4½d. a week ago to 23s. 9d., touched off take-over rumours, which were denied. The advance was later attributed to higher dividend hopes. Pollard Bearing 4s. shares were 37s., compared with 35s. 3d. a week ago.

Holman Bros. 10s. shares changed hands at 17s. 6d. and Broom & Wade 5s. shares were 26s. 7½d. Dowty Group 10s. shares declined from 37s. to 34s. 9d. reflecting the directors' progress statement indicating lower profits. Pressed Steel 5s. shares, have risen afresh from 30s. 6d. to 32s. 3d. Leyland Motors from 79s. 6d. to 82s. 9d. and T. W. Ward at 74s. 6d. more than held last week's advance. Babcock & Wilcox rose from 31s. 9d. to 33s. 6d.

## Forthcoming Meetings

March 3 (Fri.). The Institute of Transport, Tees-side Section, at Highfield Hotel, Middlesbrough, at 7.30 p.m. Annual Dinner and visit of President.

March 3 (Fri.). The Railway Club, at the Royal Scottish Corporation, Fetter Lane, London, E.C.4, at 7 p.m. Presidential Address.

March 6 (Mon.). The Institute of Transport, Darlington Group, at United House, Grange Road, Darlington, at 7 p.m. "History and work of the British Transport Commission Police," Mr. E. C. Brashier.

March 6 (Mon.). The Institute of Transport, East Anglia Section, at the offices of the Eastern Counties Omnibus Co. Ltd., Norwich, at 6 p.m. "Transport and the Nation," Mr. G. Fiennes.

March 6 (Mon.). The Institute of Transport, Sheffield Section, at the Royal Victoria Hotel, Sheffield, at 7.30 p.m. "Some aspects of European transport," Mr. C. F. Klapper.

March 7 (Tue.). The South Wales & Monmouthshire Railways & Docks Lecture & Debating Society, at Cardiff, "Britain's links with European surface transport," Mr. J. L. Harrington.

March 7 (Tue.). The Institute of Transport, Midland Section, at the Engineering

Centre Birmingham, at 6.30 p.m. "The French National Railways," M. C. M. Hannover.

March 8 (Wed.). The Institute of Transport, South Western Section, at the Great Eastern Hotel, Exeter, at 12.30 p.m. "Topics of interest on rail development in the West," Mr. F. G. Dean.

March 8 (Wed.). The Institution of Railway Signal Engineers, London Branch, at the Institution of Electrical Engineers, Savoy Place, London, W.C.2, at 6 p.m. "L.T. methods for the control and locking of junctions," Mr. H. W. Hadaway.

March 8 (Wed.). The Institution of Mechanical Engineers, Internal Combustion Engine Group, at 1 Birdcage Walk, Westminster, London, S.W.1, at 4 p.m. "Symposium on the mechanism of combustion deposit formation and adhesion."

March 9 (Thu.). The Institution of Electrical Engineers, Supply Section, at the Connaught Rooms, W.C.2, at 7 p.m. Section Dinner-Dance.

March 9 (Thu.). The London Midland Region Lecture & Debating Society, at Friends House, Euston Road, London, N.W.1. "Société National des Chemins de fer français—a report on modernisation," M. C. M. Hannover.

March 10 (Fri.). The Institute of Transport, Yorkshire Section, at the Griffin Hotel, Leeds, at 6.30 p.m. Annual Dinner and visit of President.

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THE Proprietor of Patent No. 788236 for "Steel Parts subjected to Rolling Friction," desire to secure commercial exploitation by Licence or otherwise in the United Kingdom. Replies to Haseltine Lake and Co., 28, Southampton Buildings, Chancery Lane, London, W.C.2.

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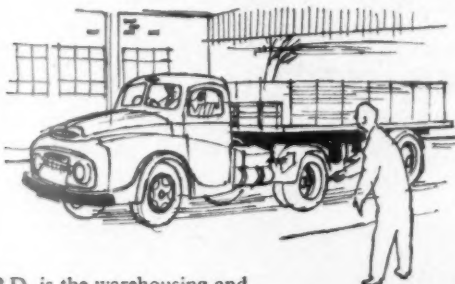
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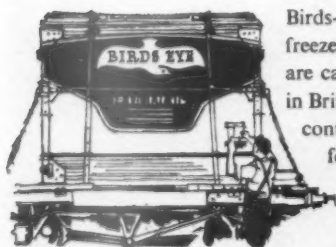
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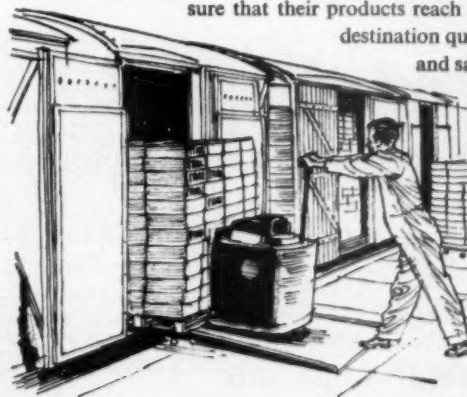
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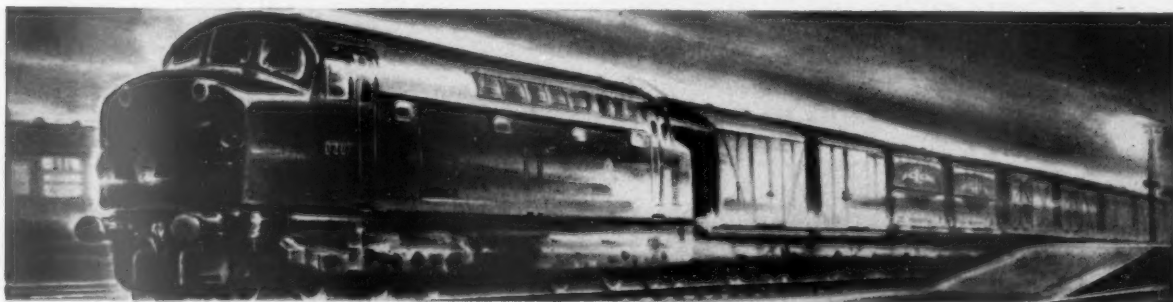
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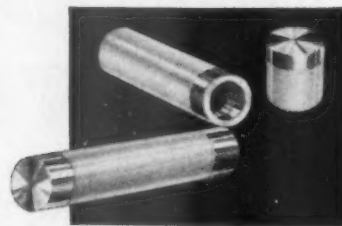


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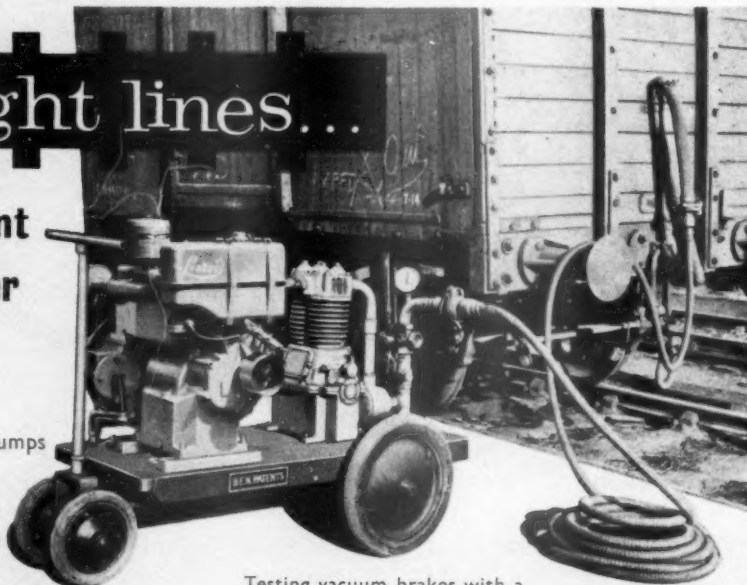
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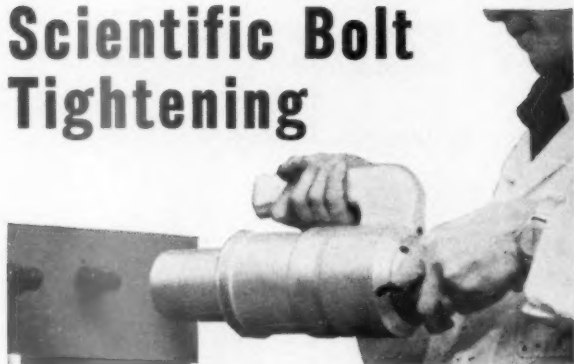
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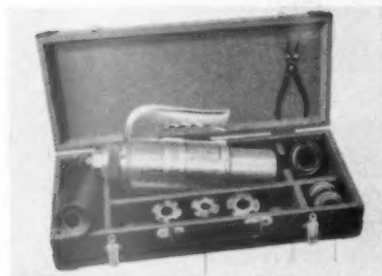
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It puzzles me, Fred . . .

Go on, George

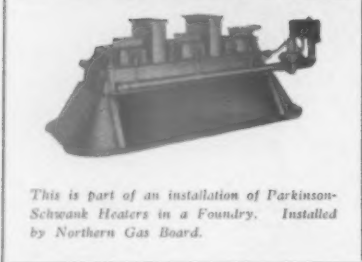
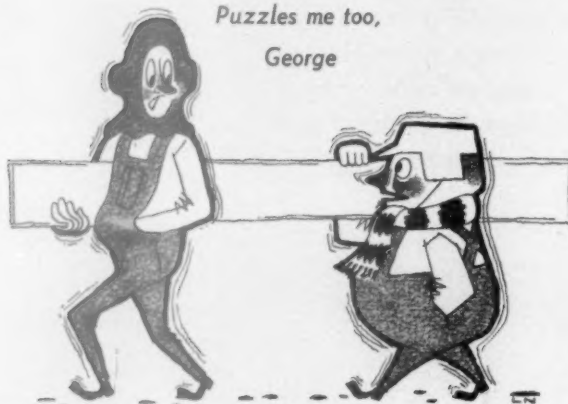
. . . why they don't have Parkinson-Schwank  
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Why they don't have what, George?

These things that keep the  
perishing place warm, Fred!

Puzzles me too,

George



This is part of an installation of Parkinson-Schwank Heaters in a Foundry. Installed by Northern Gas Board.

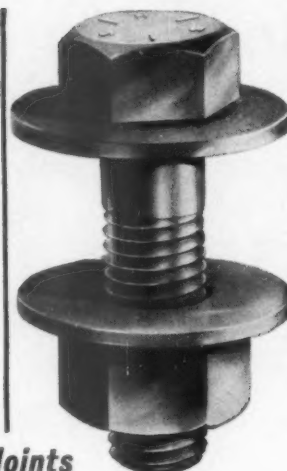
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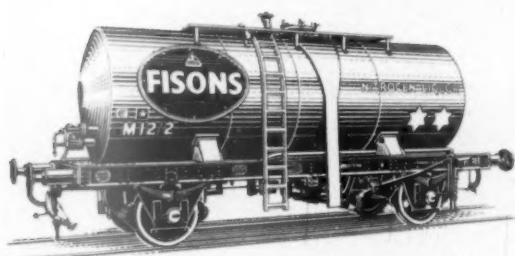
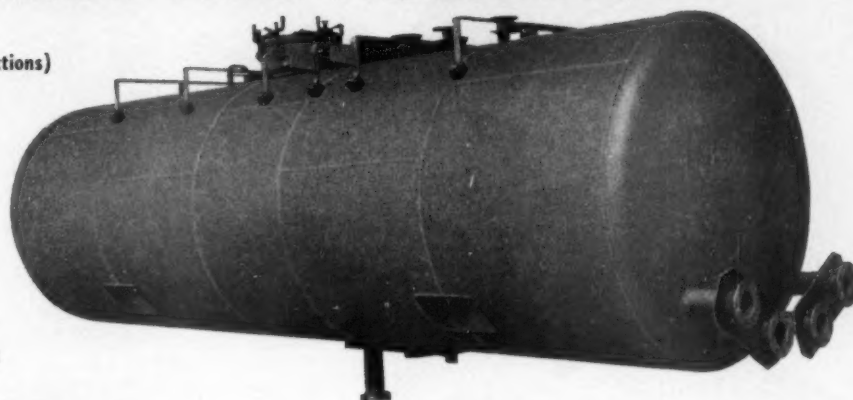
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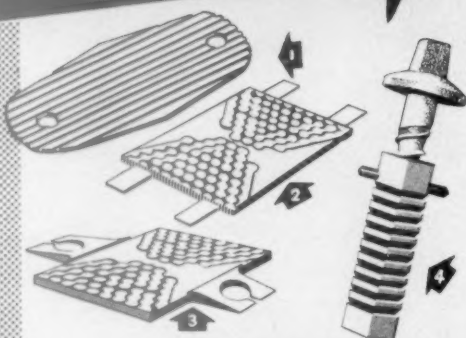
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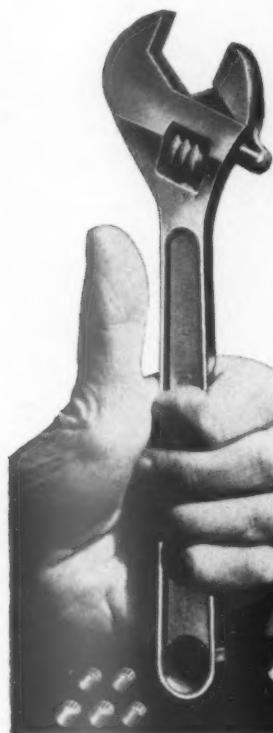
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